NOLOGY DEPT.

Gas Journal

VO . 275. 105TH YEAR. LONDON, SEPTEMBER 30, 1953. NO. 4713. PRICE 1/3

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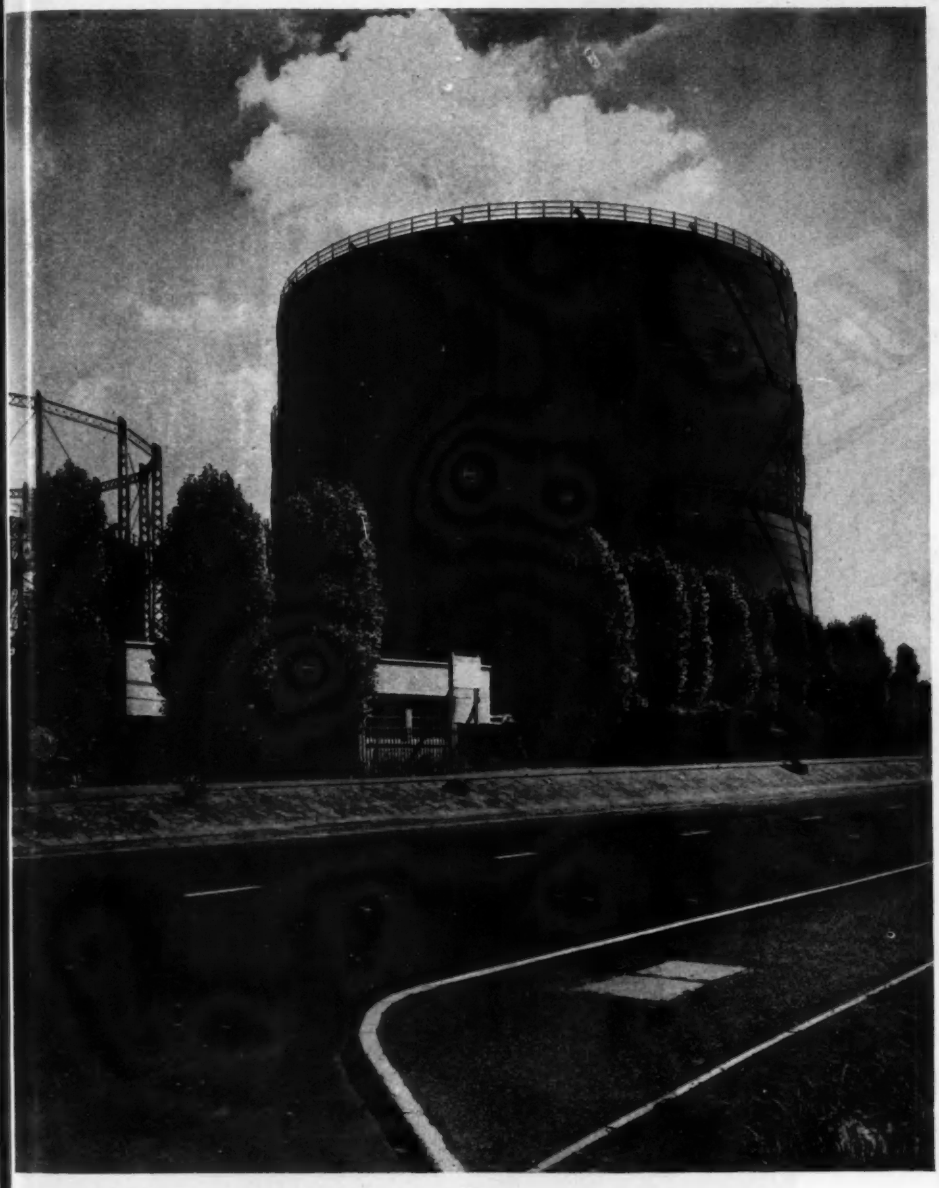

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(From a photograph by courtesy of the North Thames Gas Board)

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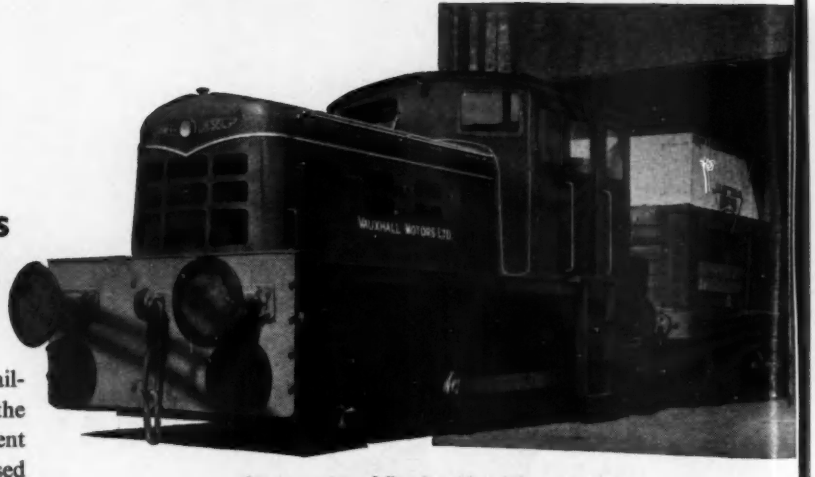

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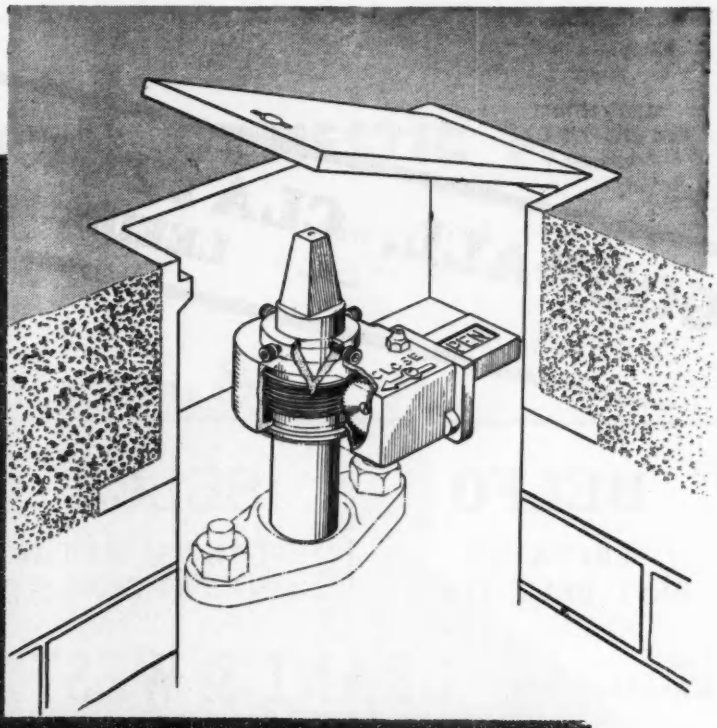

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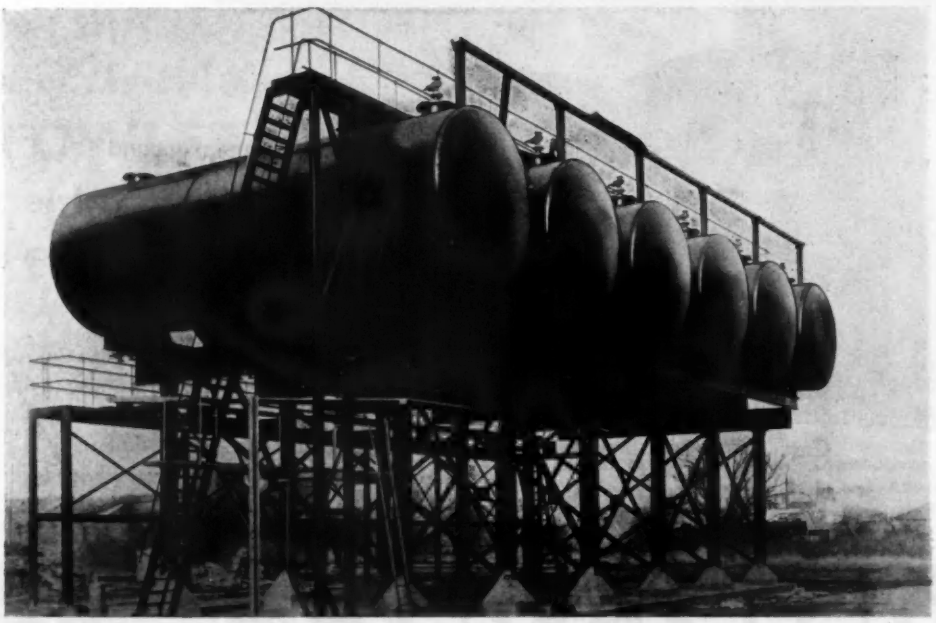

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The design has been based on the introduction unit construction,

EACH COMPONENT BEING INTERCHANGEABLE

HORIZONTAL SEALING

Strong and rigid die castings in light alloy. All seals are horizontal; draining of liquors cannot attack sealing surfaces.

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The gear box is built in, and a direct drive with the index is sealed from the gas flow.

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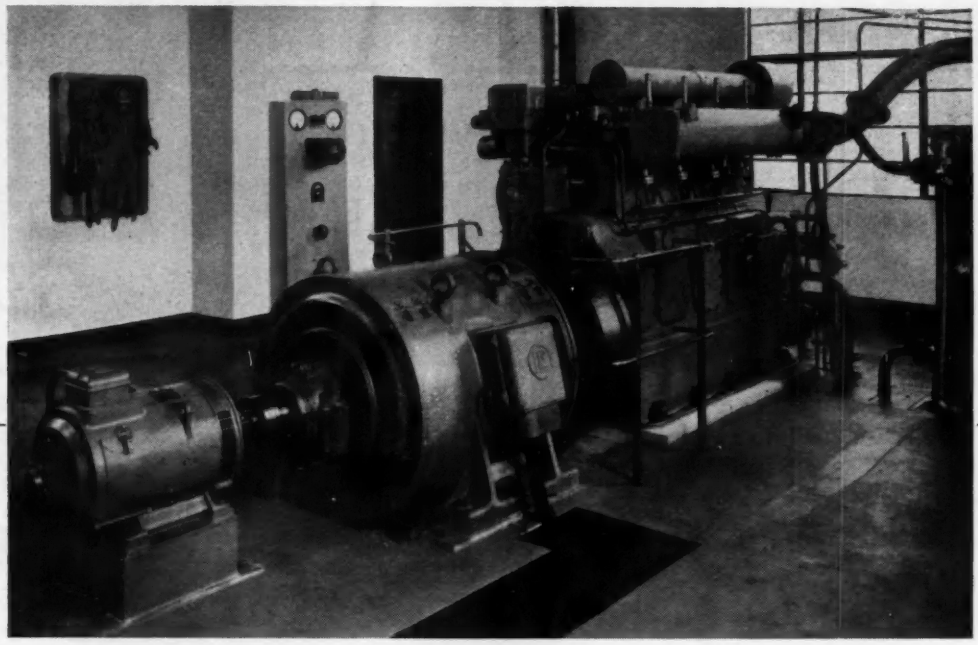
Diesel Generating Plant for the Channel Islands



The total capacity of 'ENGLISH ELECTRIC' generating plant installed and successfully operating in the Channel Islands is now well over 10,000 b.h.p.
A recent 'ENGLISH ELECTRIC' installation is of a type 4 RK diesel alternator set made for the States of Guernsey Water Works Department to operate in their St. Saviour's Works. The equipment illustrated here consists of a 4 cylinder naturally aspirated type RK diesel engine developing 267 b.h.p., coupled to a 180 kW alternator and exciter which generate a 400 volts 3-phase, 50 cycle supply for operating large motor-driven centrifugal pumps.
The supply is taken through an existing interlocking switch to the busbars of the main station feeder panel.
The complete generating plant and exciter cubicle, which can be seen at the rear of the illustration, are of 'ENGLISH ELECTRIC' manufacture.

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diesel engines

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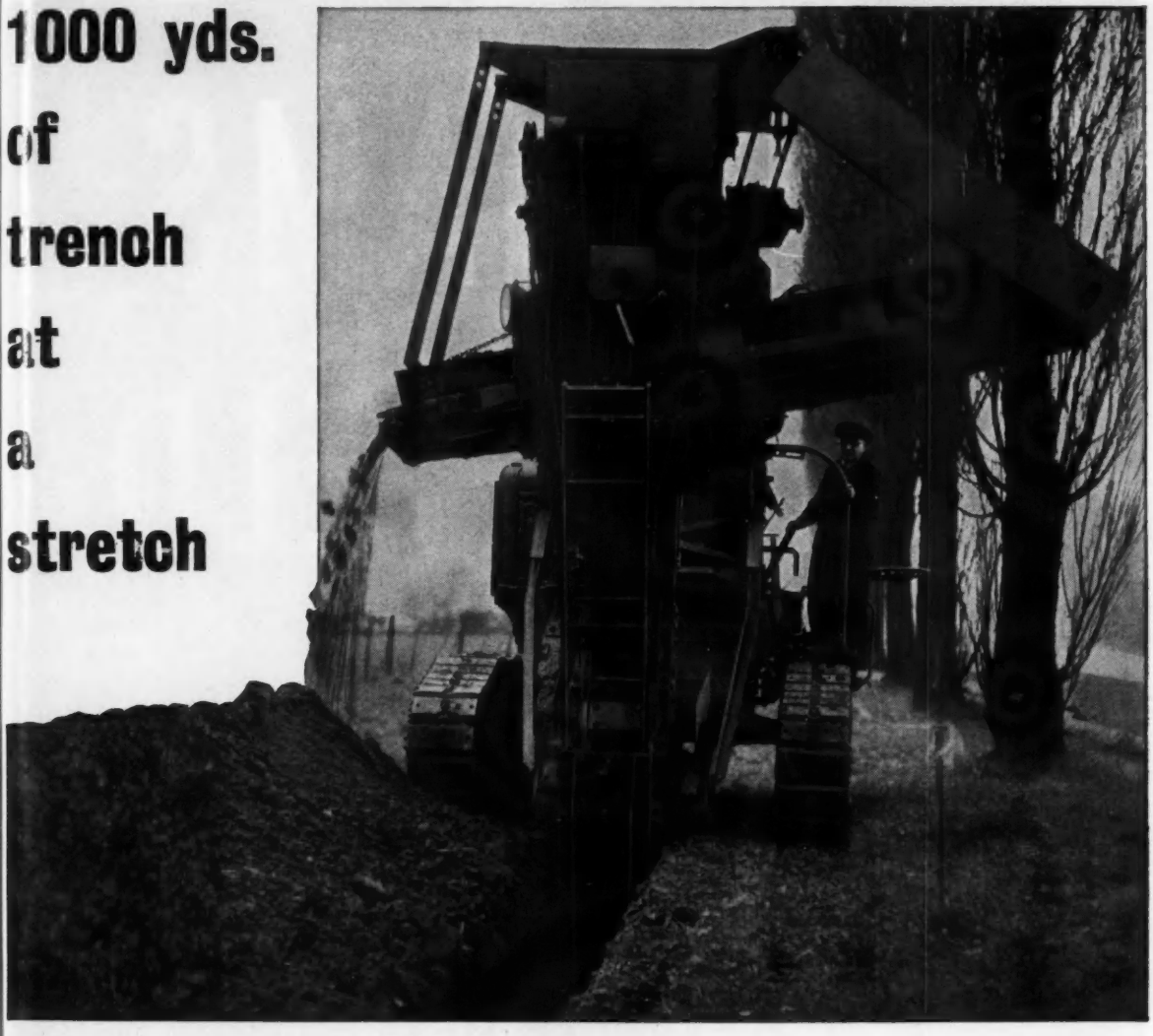
1000 yds. of trench at a stretch



The 44c Ditcher shown above is working on the Barnet by-pass, excavating a trench for the Eastern Gas Board. **Fast and Manoeuvrable,** the Ditcher cuts trenches 18", 21" and 24" wide to a maximum depth of 8' 3". **The Vertical Boom** leaves no ramp to be excavated by hand; it also allows the Ditcher to cut round corners, still keeping the boom at the required depth. An exclusive **Automatic Overload Release** protects the machine against underground obstructions and can be set to prevent damage to pipes and cables. **Operated by One Man,** the 44c Ditcher with its fast "milling action" reduces trenching costs to a minimum.

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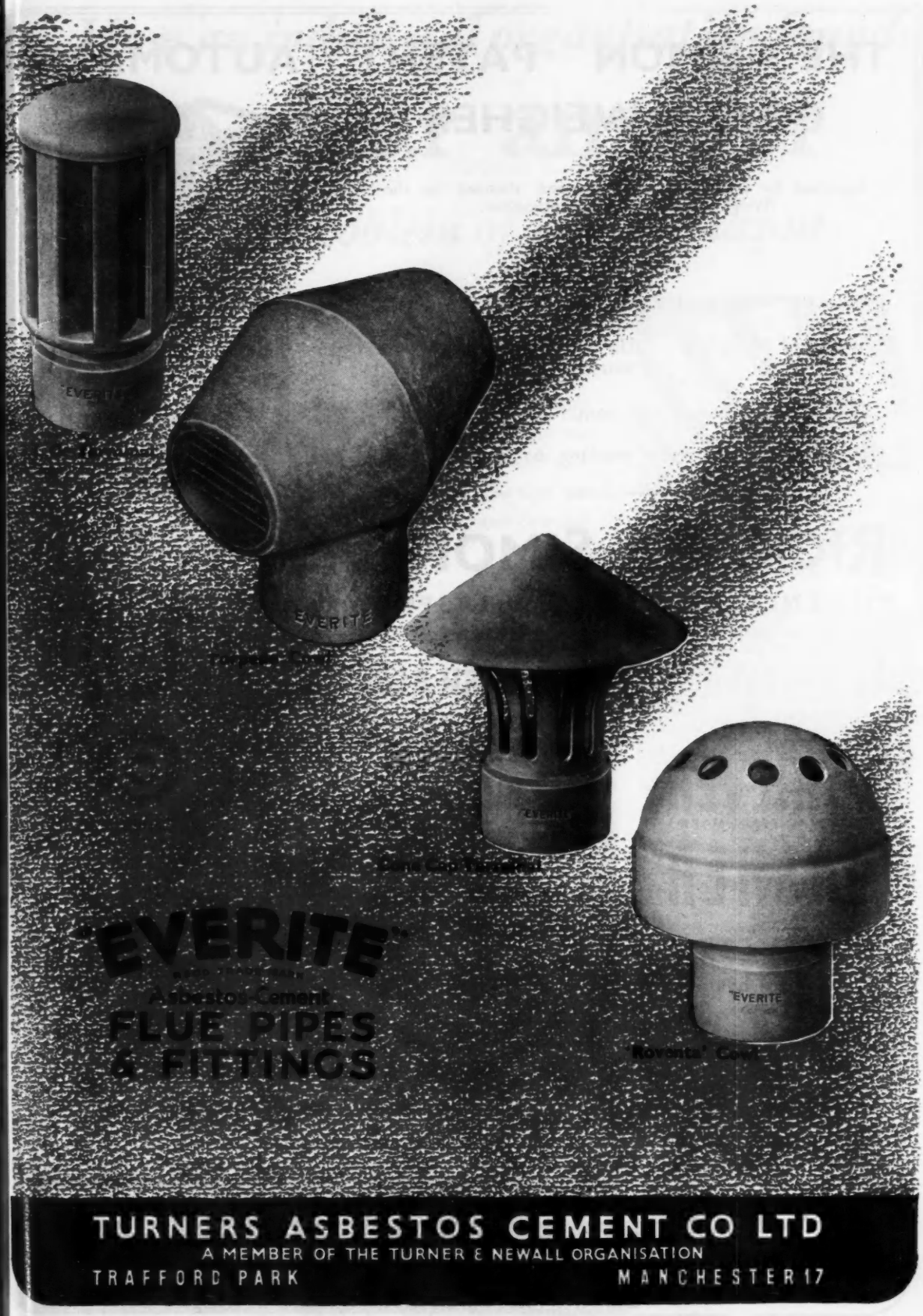
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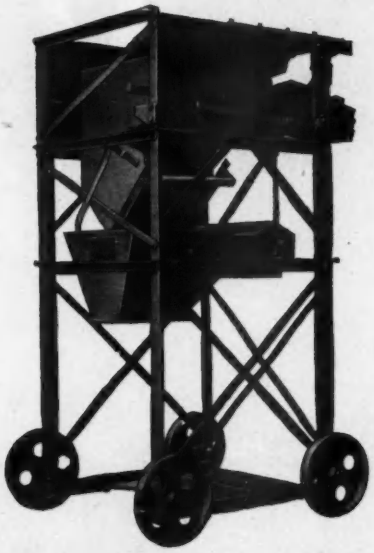

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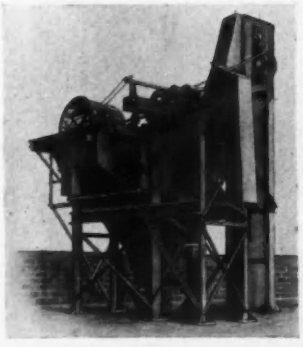

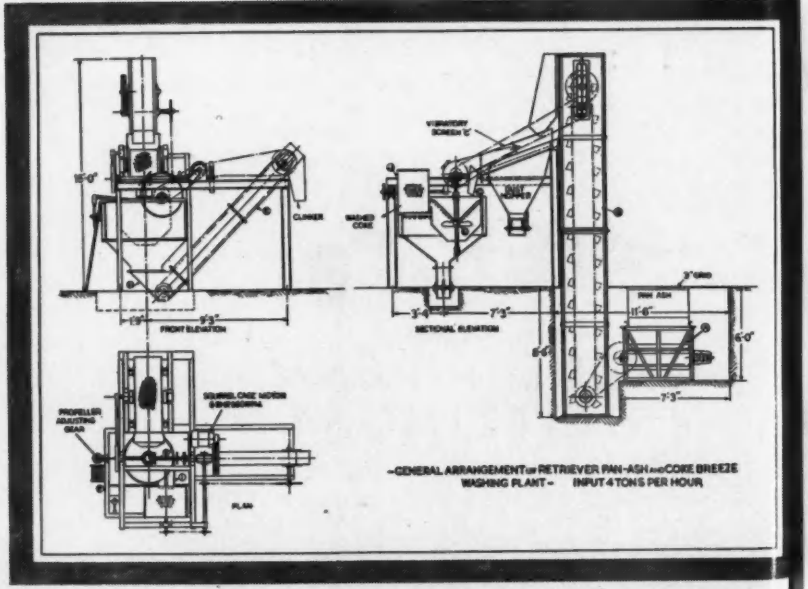

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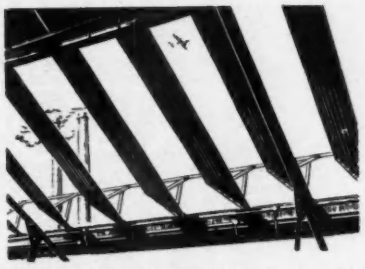

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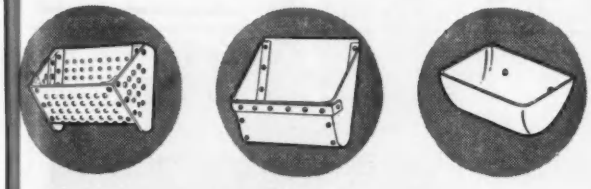

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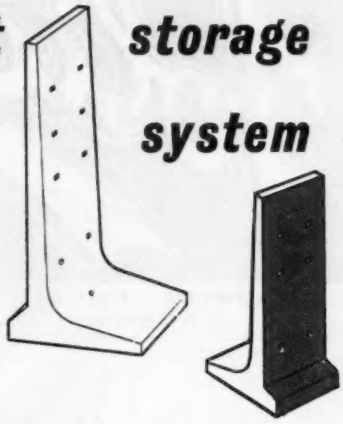

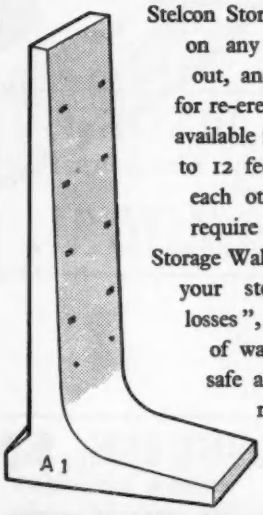

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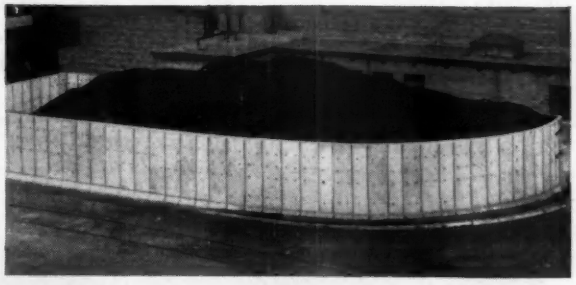

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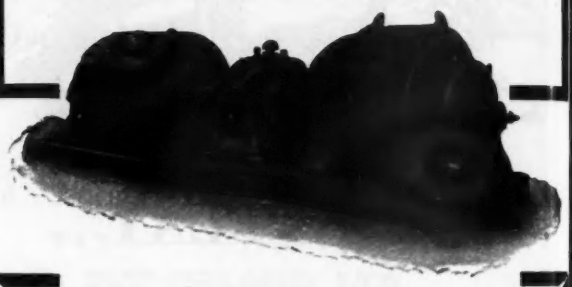

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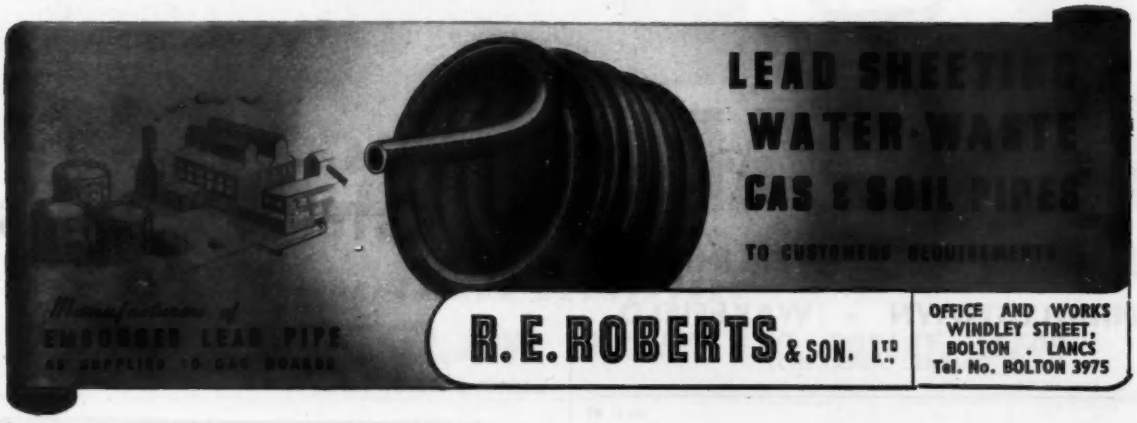

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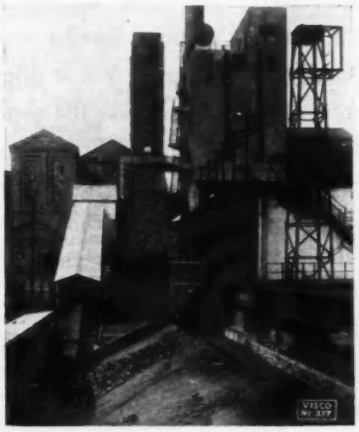

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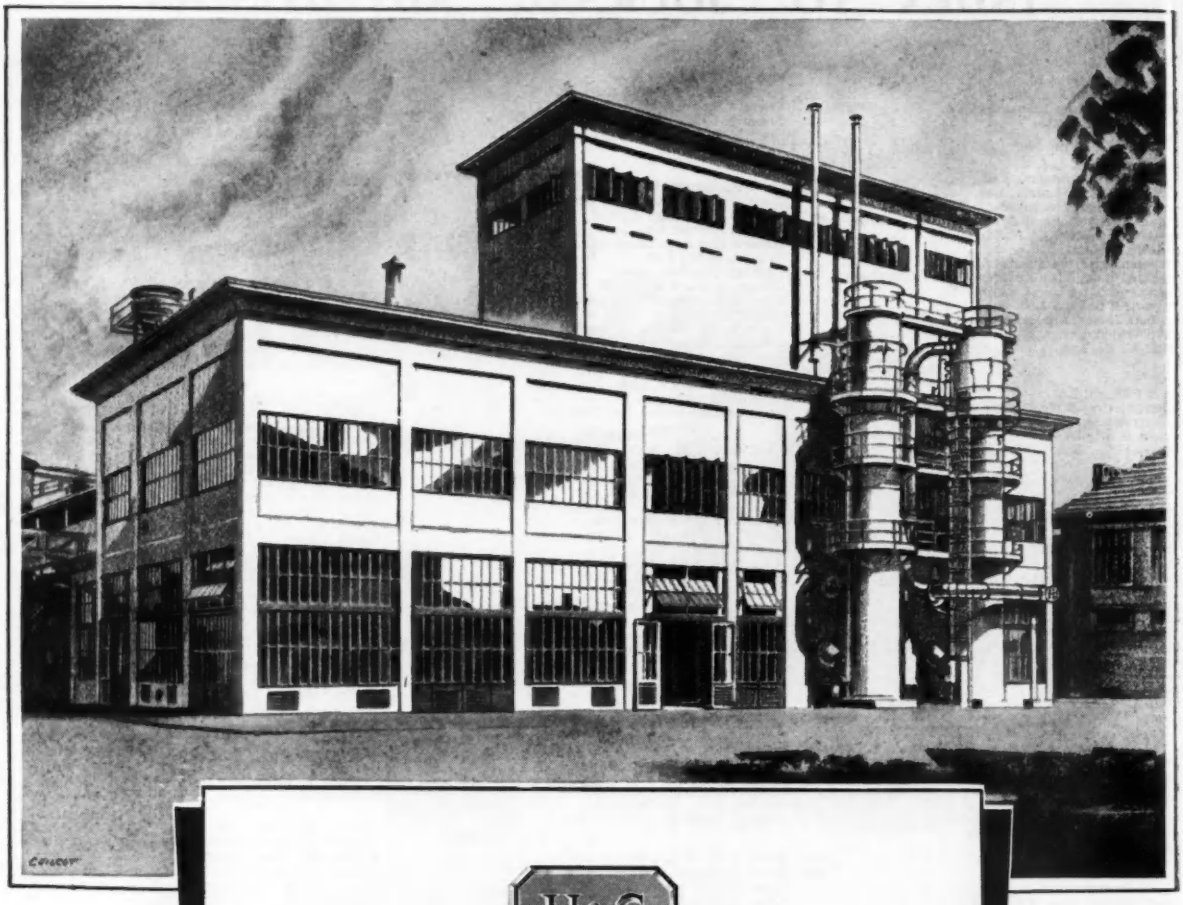

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GAS JOURNAL

VOL. 275. No. 4713 105TH YEAR September 30, 1953

ON HIGHER THINKING

In our issue of September 16 we discussed (p. 701) the question of man-power, giving the argued conclusion of the Fuel Conservation Team that one horse-power of mechanical energy is equivalent to the labour of 30 men. This problem—and it is not a nice problem—of man-power and woman-power is the basis of the paper given last week to the Scottish Association of Gas Managers (see p. 840) by Mr. Alan Beaton. The author tackles the matter from the incentive angle and advocates the assessment of work in terms of 'work units' for any particular class of employment—as far as we can ascertain from his thesis, employment varying throughout all grades from artist to gravedigger. We sense Mr. Beaton's sincerity of approach, though we think he expresses himself clumsily. The 'work unit' to which he refers surely, in practice, all boils down to the exercise of a modicum of common-sense in the day-to-day running of a commercial enterprise, whether it be gas or the frying of fish and chips does not appear to us to matter very much. But Mr. Beaton raises the 'work unit' almost to an ethical plane. While, he contends, the force of management should understand precisely what a labourer ought to get through in a given time, so should the labour force have a yardstick to determine the value of the management man-hour. It is all very interesting, of course; and we are happy to note that as a result of the author's influence, backed by that of the Scottish Gas Board, great improvement has been effected in the achievements of choke-clearing teams in the Glasgow Division.

We feel sure that Mr. Beaton will not grudge us our sentiment that one of the best incentives to greater output per man-day is to be found in the pay packet. And we feel sure, too, that the author would, like ourselves, be hard put to it to express to a member of a choke-clearing team how we should calculate the work unit of, say, a chairman of a gas board in Scotland, Wales, or even England. And this is not by way of 'poking fun.' How often have we witnessed during the past few weeks charming and seemingly innocuous children, grouped around the easel of an artist of current repute, asking the maestro what his work was all about and why he was 'carrying-on' so. Perhaps these youngsters will grow up to evaluate with swift precision the 'work unit' of the artist or the 'woman-power' of the lady typist. On this aspect Mr. Beaton does, it is only fair to say, shed light and offer guidance. Thus, he comments, 'an efficient secretary typing letters can be considered as producing the same number of work units of effective effort in a given time as, for example, a pipelayer or a caulker. The kind of output and the physical energy required in each case are, of course, completely different, but the work units produced can be considered to be the same provided that the same amount of effective effort is being expended in each case to bring about an efficient result. It will be clear that the enormous variety of work carried out makes varying demands on physical and nervous energy.' The foregoing is quite a long quote. The meaning therein is doubtless profound. In our time we have had a shot at reading Hegel, Kant, and other illustrious gentlemen. They, too, have had their reasoning, but we find it difficult nicely to evaluate their lines of thought in 'work units' in this age of supersonic enlightenment.

To our shame we must confess to scanty and maybe scatter-brained perception of industrial psychology. We have met and still encounter many who have gone through the Aldwych ropes to become eminent in the haberdashery, druggist, and cocoa and chocolate fields; and we know a few—and they are comparatively rare—who have descended, in spite of their training, to the academic sphere. In other words, we are in no wise qualified to comment seriously on, or even to criticise gently, the 'work unit' pari-mutuel expounded by Mr. Beaton. But when we come to that part of the paper where the author so caustically discusses and contemns the fuel expenditure index we feel on somewhat less shaky ground. 'As a comparative index of achievement,' says Mr. Beaton, 'it is of little value since it takes no account of the age and type of plant being used or the quality of the coal carbonised.' We think that the author is to an extent missing the point and confusing the issue. The F.E.I. is a comparative index of achievement, though, of course, relevant circumstances and conditions have to be taken into account and necessarily influence any conclusions which are drawn. But here again it is a matter of common-sense. It would, we suggest, be over-optimistic to expect a senile of ninety whose diet is cabbage to scull as rapidly or as smoothly as a youngster of nineteen or twenty who contentedly lets digestion wait on appetite. But more of this anon.

GAS IN EIRE

In two papers presented at the Irish Gas Association's meeting (they were published in the *Journal* last week) are indications of the effects of the shortage of coal production in the British Isles and its high price. The position in Eire appears to be even more precarious than it is in France but it is interesting to note that somewhat similar steps to cope with it are proposed in both countries. Indeed they are well past the proposal stage in the latter country. Again we may look back to M. J. Kec's I.G.E. Comm. No. 404 on 'The Gas Industry in France' and to our own feature 'Gas in France' where we have from time to time recorded the steps taken to utilise alternative fuels to eke out insufficient supplies of gas-making coals and to reduce expensive imports of coal.

The account by Messrs. N. J. Robertson and H. C. Harrison of the processes now available for the gasification of heavy oils is a fair summary. The ONIA-GEGI plant which they particularly describe is one of those which approximates to the carburetted water gas technique with the addition of a catalyst. It is said to have reached the stage of a prototype plant at Cahors, a fact which we have already recorded. The Stanier and McKean plant has not so far been reported to have progressed further than the construction of the pilot plant. We all await with some eagerness further news of it. In this country, where home oil refinery is also making rapid strides, plants of this type will no doubt in the first place be used, as indeed Messrs. H. Stanier and J. B. McKean have said, as peak-load plant, a field in which they should have a useful future. In Eire, on the cost figures quoted by Messrs. Robertson and Harrison, they may well play a more important part in gas supply.

Mr. A. L. Allen applied himself to the influence of thermal efficiency on gas sales. No one in the industry will quarrel with his analysis of the method of assessing efficiency and his criticism of the attitude towards the question of the Ridley Committee. His acknowledgment of indebtedness to Watson House is shared by the whole of the British gas industry. It is interesting to note that the great Dublin Company is taking a generous part in supporting the Association and the industry in Eire. He touches on a weak point in cooker design, the unreliability of ignition devices; it is a weakness which runs through most of the range of, particularly, domestic appliances. The other weakness is the persistent high organic sulphur content of the gas distributed. Even if this were very materially reduced there remains the problem of the disposal of products of combustion, generally, in appliances not provided with a flue. It is one of the defects of the gas-fired water heater, giving an immense advantage to our electrical competitors. The other defect, that of loss of heat in the contents of the pipes leading from the heater to the point of use, is common to both. The instantaneous heater mounted at the point of use gets over the difficulty but here again we are confronted by the disposal of combustion products. Sulphur is not the only difficulty, but it is a major one. The flueless space heater cannot be comfortably accommodated in the dwelling-house unless there is plenty of space in which water vapour can be dissipated.

These are not new problems and no new methods of dealing with them are suggested in these papers, but it was useful once more to call attention to them. Action can be taken on some of them. It should not be too long further delayed.

EXTENSION OF SMOKELESS ZONES

It is good to hear that the Manchester Health Committee has approved a proposal that the existing smokeless zone be extended marginally to include a further 130 acres. In this new area there are 6,694 appliances for cooking, hot water, and steam supply; and, in fact, 5,115 of these appliances, using gas, electricity, or oil, are smokeless. Manchester Corporation—ever in the van of the smoke abatement movement—is also seeking to create smokeless areas in six districts of Wythenshawe, where smokeless appliances have been installed in new houses. We learn, too, that Liverpool, Birmingham, and Nottingham are considering smokeless zones, and Greenock, which already possesses the necessary powers, is reported to be likely to take action in the near future. Again, Tottenham Health Committee has recommended that a smokeless zone should be established in the Markfield re-development area. The Nottingham City Council has, indeed, decided that the Clifton area, where vast developments are taking place, should be smokeless. A condition is attached to each tenancy providing that no smoke shall be emitted from the premises and that all grates and other appliances using any solid fuel shall be fired by smokeless fuel. Mr. Alfred Wade, Chief Sanitary Inspector, has explained that this smokeless area is proving a great success. In his own words, 'to visit this vast housing estate on a cold day and see no smoke emissions from its many chimneys is a unique experience. It is a striking and practical example of the soundness of the smokeless zone policy.' Cooking at Clifton is by gas and the principal solid fuel used is gas coke. The general support now forthcoming in respect of schemes to promote a clean atmosphere should encourage progressive local authorities to proceed on some such lines as those adopted at Clifton.

Latest news comes from London. At Guildhall on Thursday last the Court of Common Council decided to seek Statutory powers to declare areas in the City as smokeless zones. The Corporation will include plans to cut down smoke in the City in its Various Powers Bill which is to be debated in Parliament later this year. The Corporation seeks to prohibit the installation of heating equipment within the City unless such equipment is, as far as practicable, capable of being operated without giving off smoke.

COAL BOARD PROFIT

Thanks, in part, to the higher price which the gas industry has had to pay for its coal since the beginning of March the National Coal Board has been able to report a larger profit for the second quarter of 1953. It is a pity the gas industry does not present a quarterly statement, nor does its accounting year tally with the Coal Board's calendar year, so, except to the extent of a single month's operations, we shall not see the officially recorded effects of the latest coal price rise on the gas industry's finances until perhaps six months after the end of the fifth year of nationalisation—1953-54. Meanwhile, let us derive what satisfaction we can from the fact that at all events the Coal Board surplus in the June quarter amounted to £808,187, compared with £541,133 in the previous quarter, and a loss of £727,563 in the corresponding quarter of last year, bringing the deficit accumulated since vesting day down to £12.65 mill. Estimated colliery profits for the quarter were £6,308,187, compared with £5,523,133 in the first quarter of 1953 and with

£3,147,437 in the corresponding quarter of 1952. The estimated net surplus for the quarter is arrived at after adding the profits of ancillaries and charging taxation and estimated interest.

DECREASED OUTPUT

The increased surplus was achieved on a decreased output, a fact which further emphasises the effects of the rise in prices. Output of commercially saleable coal in the June quarter fell 2,676,100 tons to 48,281,612 tons, figures for the March quarter being 50,957,712 tons, and for the June quarter of 1952 48,530,091 tons. Normally, the first and fourth quarters of each year are the times of good earnings, but profits this year have moved against the seasonal trend because of the average rise of 10% in prices charged. Between the second quarters of 1952 and 1953 the Coal Board's total costs rose by £6.8 mill., or 2s. 11.2d. per ton. The biggest single rise was one of 1s. 9.8d. per ton in labour costs, resulting partly from an increase in miners' wages last November and partly from the granting of a second week's paid holiday. Detailed returns show that four divisions carried the losses of the other five. Higher wages and lower output combined to put wage costs up £4 mill. over the figure for the first quarter of 1952, and they now account for £1 17s. 2½d. of the £2 19s. 2.7d. total costs of a ton of saleable coal. All workers earned on average £2 5s. 5d. a shift, or £11 8s. 6d. a week compared with £2 2s. 3d. and £10 17s. 5d. a year ago.

A disturbing factor in the coal situation is that output to date is 2.5 mill. tons lower than last year. Merely to reach the 1952 level would require another 170,000 tons a week from deep mines and opencast sites, without taking into account the fact that consumption is running at about 2.5 mill. tons greater this year. Total distributed stocks in the week ended September 12 stood at 16,597,000 tons, a decrease of 1,613,000 tons compared with the corresponding period of 1952. Gasworks which a year ago had 3,249,000 tons in stock, equal to 5.2 weeks' winter consumption, now have only 2,780,000 tons, or 4.3 weeks' consumption. Power stations have 6.3 weeks' stocks in hand against 7.5 weeks' consumption a year ago, and coke ovens, with 1.6 weeks' stocks, are just about as well off as they were at this time in 1952.

GIVING AS WELL AS TAKING

So many useful lessons have been learnt by the teams which have visited the United States under the auspices of the British Productivity Council and the former Anglo-American Council on Productivity that there has developed a tendency to overlook the fact that in every instance there has been a two-way interchange of ideas, and that both sides have benefited from the visits. From the impressions which two members of the gas industry team gave to the Wales and Monmouthshire Section of the Institution of Gas Engineers—we commented on this outstanding meeting in our issue last week—it was evident that the best in British gas engineering practice is at least equal to the best in American practice. Similar sentiments were expressed at the chemical engineering conference at Olympia during the Engineering, Marine, and Welding Exhibition, in a discussion on British chemical engineering in the light of the recently published report by the O.E.E.C. on 'Chemical Apparatus in the U.S.A.' and the report of the Anglo-American Council on Productivity on 'Heavy Chemicals.' At that conference Mr. A. G. Grant, of Whessoe, Ltd., Vice-President of the Institution of Chemical Engineers, speaking from the viewpoint of the chemical plant industry, and from wide experience and much travel in the States, said there was a very real danger of the glamour which the O.E.E.C. report shed on everything American obscuring the real pearls of wisdom which might be gathered in this country. Perhaps his accent on glamour was not without a taste of fiction; but there can be no doubt that in Britain a chemical plant industry of considerable stature exists without much shouting of the odds. The organisation structure is in fact similar to the American. We need more chemical engineers, and it is true that the great deal of fine chemical enginering done by plant manufacturers is out of all proportion to the chemical engineers employed in Great Britain. There is hope, however, British chemical engineering contractors are outstanding examples of private enterprise and concentrated competition. The chemical industry here looks too closely at immediate capital expenditure and tends itself to buy the individual items and articles needed and to look askance at the apparently high fees which it might have to pay for the 'know-how' of a specialist firm. On the other hand the Americans—as Mr. Grant pointed out—have found that the complete process engineering contractor is the man to give speed of output; and they pay adequate fees (high fees by our own standards) for that 'know-how.'

PUBLIC AUTHORITIES IN BUSINESS

The Association of British Chambers of Commerce, like other national organisations of business men, has watched with interest the trend towards more and more trading activities from private to public ownership, and a plenary session of its forthcoming annual conference at Belfast on October 1 will be devoted to a debate on 'Public Authorities in Business.' Matters likely to be brought out in the debate include the price policy of public authorities in business, co-operation with private enterprise, the possibility of separating the trading activities of public bodies from their administrative functions so that they can be conducted on commercial principles, the future organisation of public authorities and the machinery of government necessary to control them.

The conference will fall into three parts—the opening ceremony, when the Prime Minister of Northern Ireland will welcome the Association; group meetings; and the plenary session. The finance and taxation group, under the chairmanship of Mr. Frank Bower, C.B.E., taxation adviser to Unilevers, will discuss the possible future of purchase tax, and the home affairs group, presided over by Mr. T. H. Summerson, J.P., will discuss '20th Century Capitalism.' Such questions as employer and trade union relations, public ownership, and monopolies will feature in the debate. The overseas trade group, under the Hon. R. A. Balfour, will discuss the long-term effect of industrialisation plans in primary producing countries, as well as the difficulties and possibilities in trading with countries short of sterling. The subject is likely to raise the much wider question of prospective purchasers abroad seeking extended credit, and the claims of consumer-goods producing areas in Britain are likely to be pressed.

NUTTY SLACK FOR STEAM RAISING

In a letter to the *Financial Times* John Fox, M.I.MECH.E., A.I.E.E., F.INST.F., returns to the subject of fuel efficiency. He has this to say about nutty slack: This fuel is carbonised on domestic grades, and in the process little heat is released, but, on the other hand, quantities of smoke are produced. The latter is of the thick, grey, oily variety, full of benzpyrine which is injurious to health and a contributory cause of much fog. And yet the public has been persuaded to use this non-rationed fuel by reason of a price reduction of £1 a ton. At the same time, no inducement was offered to the industrialists to burn it for steam-raising, which can be achieved efficiently and smokelessly provided that suitable mechanical stokers are installed.

Personal Notes

MR. F. S. CHARNLEY, Deputy Chief Engineer of the North Eastern Gas Board, has been appointed Constructional Engineer to the West Midlands Gas Board.

MR. JOSEPH G. MUSCROFT, who has been with Hattersley & Davidson, Ltd., and their associated company, the Wormald Patent Locks Co., Ltd., of Sheffield, for 20 years, and as an outside representative since 1946, will in future cover all areas of England and Wales, Northern Ireland, and the Isle of Man. Another representative is being appointed for the Scottish Gas Board area.

MR. R. BARLOW, General Manager of John King & Son (Enamellers), Ltd., Chesterfield, who became associated with the company following the death in May, 1952, of Mr. John King, senior, has become a Director of the company with effect from September 18, but continues as General Manager. Mrs. W. A. King, whose husband, Mr. John King, junior, died suddenly last February, has been Managing Director since her husband's death.

MR. CHARLES KEITH, previously with Ascot Gas Water Heaters, Ltd., has been appointed representative of Sidney Flavel & Co., Ltd., Leamington Spa, for Scotland. Other additions to the sales staff of Sidney Flavel & Co., Ltd., are announced as follows: MR. H. J. ARNOLD, previously with Rochester gas undertaking, has been appointed representative in South Eastern England. MR. BARRY RICHARDS has been appointed representative in the West Midlands and Wales areas, and MR. D. J. KING, previously with Ipswich gas undertaking, has been appointed representative in the Eastern area.

MR. K. E. CHAMBERS, Deputy Engineer and Manager at Leamington, has been appointed Engineer and Manager, Malvern District, West Midlands Gas Board. Other appointments announced by the West Midlands Board are: MR. J. A. TOMES, formerly Deputy Engineer and Manager, Stourbridge, to be Works Engineer and Manager, Stourbridge; MR. F. W. SIDAWAY, formerly Deputy Engineer and Manager, Cradley Heath, to be Works Engineer and Manager, Cradley Heath; and MR. J. BATES, formerly Shift Superintendent at the Barford (Nottingham) works, East Midlands Gas Board, to be Deputy Engineer and Manager, Redditch Group.

MISS MARY LEIGH will take over the duties of General Secretary of the Women's Advisory Council on Solid Fuel from October 16 on the resignation of MRS. FRASER-STEPHEN, M.A. Miss Leigh has been in the fuel world since 1926, and since 1944 has been Technical Officer to the Council, which she represents on many constituent organisations. She is a member of many committees of the British Standards Institution, of the National Council of Women (Housing), the Home Safety Committee of Ro.S.P.A., and an observer on the British Coal Utilisation Research Association Advisory Committee on Domestic Appliances Research.

MR. W. H. SALES has been appointed by the Minister of Fuel and Power to be a full-time member of the National Coal Board to fill the vacancy caused by the retirement of MR. EBBY EDWARDS. Mr. Sales is at present Deputy Chairman of the North Western Division of the Board. His new appointment is for a period of five years. Mr. Sales, who is 50, entered the coal industry in 1919 and worked underground for six years in North Derbyshire. He studied at University College, Nottingham, on a two day a week release scheme adopted by the colliery owners and went, in 1927, to London University on a Miners' Welfare National Scholarship, graduating with honours in economics in 1930. From then until 1946 he held various teaching posts. In 1947 he became Deputy Labour Director of the East Midlands Division of the National Coal Board and held that post until October, 1951, when he was appointed Deputy Chairman of the North Western Divisional Board.

MR. A. B. BRITTON, Engineer and Manager at Hinckley, retires today after over 43 years service in the gas industry. Starting with the Birmingham Gas Department in January, 1910, he had a wide and varied experience at all five of the Birmingham stations as well as the central laboratory. He went to Hinckley in 1932 as Engineer and Manager and has been in charge of the undertaking for over 21 years. During that period the gas production at the Hinckley works has doubled, the gas manufactured in 1932 being 233 mill. cu.ft. and, in 1953, 455 mill. cu.ft. Up to vesting date Mr. Britton took an active part in the various national associations connected with the gas industry. For many years he was one of the six elected members representing the Midland Counties on the Management Committee of the British Gas Council and a member of a number of its sub-committees. He has been interested in the development of domestic gas and appliance sales, having been Chairman of the Midland Committee of the British Gas Council on domestic gas development. He was one of the founder members of the Midland Counties Coke Association and sat on its Managing Council until vesting date. He took an active part in the Federation of Gas Employers, being a member of the Midland Management Committee and a member of the Midland Joint Industrial Council for the Gas Industry. He is a past President of the Midland Association of Gas Engineers and Managers, now the Midland Section of the Institution of Gas Engineers. When Mr. Britton went to Hinckley the gas industry was experiencing difficulty in disposing of its ammoniacal liquor, due chiefly to the fall in prices of ammonia. Hinckley was particularly embarrassed with this problem, so much so that the Institution of Gas Engineers chose Hinckley as the site at which to commence research on liquor disposal. As a result, the first full-scale plant was erected there to deal with this problem. Arising from this work Mr. Britton has for many years been a member of the Liquor Effluents and Ammonia Committee of the Institution of Gas Engineers. In 1949 when the industry came under national ownership Mr. Britton was appointed Chairman of the Board's Liquor Effluents Advisory Panel. He is a founder member of the Gas Officers' Guild, having sat on the managing council almost continuously since its formation in 1947, and has been Chairman of the Midlands Branch since its formation.

Correspondence

'S' OR 'Z'?

DEAR SIR,—Some may think that J. J. C. B. B. is splitting a hair or starting a hare, but why not have fun in the silly season? He may not know that Parliament is on his side in that the Gas Act twice speaks of 'carbonization.' He would perhaps accept 'nationalization' as a new addition to our key words. Here the Concise Oxford Dictionary supports him; it uses z, without the option.

Not so Parliament, which on April 8, 1948, actually debated the merits of 'S' or 'Z.'

In 1946 the coal industry Nationalisation Act was passed and the Finance Act spoke of 'nationalisation.' The Electricity Act did likewise in 1947 and the family of Coal Industry Nationalisation Orders followed suit. In 1948, however, 'nationalization' appeared in the Gas Bill.

Quite a rumpus ensued. The Opposition had divided opinions, but thought that on such an important issue the Government should really make up its mind and stick to it. Consistency prevailed; Mr. Gaitskell gracefully gave way and the Z was deleted.

So Parliament perpetuates its own errors. The Select Committee on Nationalised Industries was perhaps misnamed from birth, and its reports are strewn with the word 'nationalised.'

If only J. J. C. B. B. had spoken earlier he might have done more than save the British Standards Institution. In the very issue which carries his letter you, Mr. Editor, write of the 'carbonising' industry. You refer also to 'regionalisation,' 'utilisation' and 'standardisation.' You even mention 'nationalisation' (and so do I). We illiterates prefer it that way, and Shakespeare likewize often pleazed himself.

To be serious for a moment, it seems from my ancient dictionary that when nouns and adjectives undergo verbization a Z results. Witness, mechanize, realize, standardize, visualize, and epitomize. These and their brethren, after renounization, degenerate to nationalization and the like. The pure-bred verb scorns such goings on. Revise, devise, surprise, and arise eschew the Z and (spell it how you will) to -ation them might cause some surprization.

Yours faithfully,
R. H. STUDHOLME.

380, Gresham House,
24, Old Broad Street,
London, E.C.2.

Diary

Oct. 2.—SCOTTISH G.C.C.: Scottish Gas Board Offices, 26, Drumsheugh Gardens, Edinburgh, 11.30 a.m.

Oct. 2.—COMBUSTION ENGINEERING ASSOCIATION: Inaugural Meeting, Midland Section, Imperial Hotel, Birmingham, 11 a.m. Opening Address by J. H. N. Thompson, Chairman; 'Fuels and Combustion,' A. C. Dunningham; 'Shell Type Boilers and Methods of Firing,' E. G. Ritchie.

Oct. 3.—YORKSHIRE JUNIORS: Annual General Meeting; Address By J. G. Tilley, Group General Manager, Huddersfield-Halifax Group, Bridge Street, Leeds, 2.30 p.m.

Oct. 6.—MIDLAND JUNIORS: Presidential Address: J. A. Tomes (Stourbridge); Birmingham.

Our Camera at

THE IRISH MEETING

Waterford 1953

Mr. J. W. Kneeshaw, Acting Engineer at Clonmel, with his son, who is at Drogheda. Mr. J. W. Kneeshaw's grandfather supplied Clonmel with gas in 1842. On the right are the authors of the two papers—Mr. H. C. Harrison, Mr. N. J. Robertson, and Mr. A. L. Allen.

Dr. W. T. K. Braunholtz, Secretary of the Institution of Gas Engineers, with Mr. and Mrs. J. T. Haynes, Mr. and Mrs. Ronan, and Mr. and Mrs. Robertson. In the right hand group are Mr. and Mrs. Dumbleton, Sen., Mr. and Mrs. Dumbleton, Junr., with Mrs. Frank West, Mr. and Mrs. Harrison, and Mr. H. Saville.

The Mayor of Waterford (Councillor F. P. Browne), with the President, Secretary, members, and visitors.

Scottish Association of Gas Managers

92nd Annual Meeting in Edinburgh

THE 92nd annual general meeting of the Scottish Association of Gas Managers was held in the Assembly Rooms, George Street, Edinburgh, on September 24, the President, Mr. Robert Cowie, M.INST.GAS E., Hawick, welcoming a large attendance. Following the intimation of a number of apologies from members and from office-bearers in kindred societies, the President referred to the support and encouragement given to the Association by Sir Andrew Clow and his colleagues on the Scottish Gas Board and called on him to address the gathering.

SIR ANDREW CLOW said they all valued such a gathering very much because it gave them the opportunity of listening to what learned and experienced men could tell them in the papers they presented and also because it allowed them to make personal contacts with each other. The last time he had spoken from that platform was at the beginning of the Gas Board, when Mr. D. D. Melvin was President. He thought that the years which had passed since then had taught them a great deal and brought considerable advantages, one being the fact that they had been able to exchange differing opinions and get some co-ordination as far as their ideas were concerned.

A temptation assailed some of them—and it grew stronger as one became older—to think that their own outlook was right and that those who differed from them were a bit of a nuisance. It was those differing opinions which, at the end of the day, provided the best decisions, an exchange of views giving the best results. He would like to see co-ordination carried still further than merely within the gas industry. Some of them had been reading the Productivity Report on Fuel Conservation by a number of business men who had visited America.

The report contained much that was well worth studying and it also contained some uncomfortable statements. After referring generally to some aspects of the fuel question the report stated that there was no evidence that any co-ordination had taken place or had been attempted, as far as fuel was concerned. On the contrary, the authors of the report said that each industry, gas, coal, and electricity, was pursuing its own line of action, presumably because each one thought that the wider national interest was not its responsibility. He hoped that those present that day would agree that the national interest was their responsibility. There should be closer co-ordination and he would welcome any encouragement they could give towards a fuller fellowship.

The PRESIDENT, after thanking Sir Andrew for his remarks, said that in recent years the Institution had grown in prestige and importance. Many of those present that day were members and the Association was affiliated to it. They were glad to have with them Mr. W. K. Tate, Senior Vice-President, and Dr. W. T. K. Braunholtz, Secretary of the Institution.

MR. W. K. TATE said that the President of the Institution was absent because he had a long-standing engagement to attend a meeting of the Swedish Gas Association, more important than usual because of the centenary celebrations of the Stockholm Gas Association. He had sent his apologies and best wishes. According to tradition, it was his duty to bring greetings from the Institution and to express the hope that the Association would continue to prosper. On such an occasion the Institution President also, as a rule, made reference to the Benevolent Fund. He proposed to say no more on that subject because he had seen their financial statement and felt he should congratulate them on knowing that charity began at home.

The Scottish Association, as their President had remarked, was affiliated to the Institution. Many other similar associations had become district sections of the Institution, a cheaper process than affiliation. That had been done since the change in control of the industry because it was felt that thereby the Institution would be strengthened and there would be growth in the technical development of the industry. He was not going to say whether or not it was essential. They were always happy to have on the Council of the Institution representatives of the Scottish Association. They had benefited by having some eminent Scotsmen on the Council. He would suggest that the closer all organisations in the industry got together the better.

Those on the technical side of the industry had a steep hill to climb in the near future. Coal did not seem to be too easy. In Scotland they would know a great deal more about that than in the South. But they were beginning to meet the position. It was no secret

Sir Andrew Clow, Chairman of the Scottish Gas Board (left of the President, who is wearing his chain of office), with other distinguished visitors at the Edinburgh meeting.

The Captain and Mrs. Campbell and Mr. C. B. S. Mitchell, the cup winner, with members of the Golf Circle Committee.

that before many years had passed coal, as they knew it today, would become almost a memory.

It was therefore for them as technical people in the industry to bend their minds very much to the design and operation of plants and processes to cope with the raw material they were going to receive. They had got to do that because it was no good to sit back and expect they would be getting the coal as in the past. There were many ways of dealing with coal and in the district sections of the Institution and its affiliated associations there was a great deal of knowledge which never saw the light of day, knowledge which came from the endeavours made from time to time to cope with unusual circumstances and to produce what they were being paid to produce from something to which they were not accustomed.

Meetings like the present one provided a platform for an exchange of that knowledge. He begged them to continue to take the fullest interest in their Association and to place at the disposal of their colleagues such odd bits of knowledge as they might possess. They might not realise how important these were, but they added up to a useful whole. He knew of no other means of getting to know these things. They should therefore not be backward in coming forward.

Mr. Tate, concluding, said that from a personal angle he was delighted that his President had asked him to deputise for him. His visit brought back happy memories of the right royal time he had in March when he addressed the Juniors. He congratulated Mr. Cowie on reaching the chair of the Association and extended his best wishes for his future.

The PRESIDENT, thanking Mr. Tate for his remarks, said his words had not fallen on deaf ears. Looking back, it did not seem so long since Sir David Milne-Watson was advocating the formation of a Ministry of Fuel and Power. Today they had with them Mr. J. S. Smith, of that Ministry, who was also an old friend.

MR. J. S. SMITH, briefly acknowledging his reception, said the Minister had asked him to convey the hope that they would have an excellent meeting.

Following the approval of the annual report and statement of accounts, it was unanimously agreed to admit the following to membership:—

Ordinary Members: Thomas R. Cameron (District Manager, Grangemouth); James McK. Duncan (District Manager, Callander); and Alex. W. Stephen (District Manager, Oban).

Extraordinary Members: Edward Butterworth (Managing Director, Begwaco Meters, Ltd., Farnworth, Bolton); C. T. Baker-Orr (Sales Controller, N. Region, Radiation Group Sales, Ltd., London, W.1); Douglas Harrison (Area Constructional Engineer for Glasgow and West of Scotland, Woodall Duckham Construction Co., Ltd., London, S.W.1.).

The PRESIDENT intimated that it had given the Council great pleasure to nominate Mr. James Campbell and Mr. David Fulton, as Honorary Members. Their names were household words in the industry in Scotland and further afield. Both had given long and distinguished service and made a notable contribution to the Association. They had both held many offices, but he knew they would prefer him not to enlarge on the subject. He wished them both a continuance of the excellent health which they both enjoyed and trusted that they would be long spared to give them their counsel at their meetings.

Presentation of Certificates

The PRESIDENT intimated that it had been decided not to make the usual award to the most distinguished Scottish student taking the Institution examinations. Thereafter, he handed over certificates to the following: Kenneth M. Buchanan, Edinburgh; Frederick B. Keillor, Greenock; Kenneth T. Philip, Broughty Ferry; Robert Rae, Aberdeen; William F. Smith, Edinburgh; Andrew Simpson, Johnstone; and Patrick Winn, Stirling.

MR. GEORGE E. H. KEILLOR, Airdrie District, Lanarkshire Division, then presented his paper on 'Operation Oxygen' (see p. 833).

The PRESIDENT announced that Mr. Athol W. Brown, Aberdeen, would succeed him in the chair and that Mr. W. C. Campbell, Paisley, had been appointed Junior Vice-President. Messrs. James Hall, Provan, Glasgow, and A. MacFadyen, Dumbarton, had been elected to the Council. Thereafter he installed his successor, wishing Mr. Brown all success in his forthcoming year of office.

The new PRESIDENT said that his experience as Secretary had enabled him to appreciate the responsibilities of the chair. He acknowledged the confidence placed in him by the members and would seek to justify it.

MR. E. G. SMITH, Glasgow Division, presented Mr. Cowie with a memento of his year of office.

Golf players and workers at the Bruntsfield Links.

Non-playing members at the Bruntsfield Links. Left to right: J. E. Blundell, R. B. Glover, R. H. McKellar, and Alan Young.

It was announced that the Spring Meeting would be held in Dunblane Hydro on Friday, April 9, 1954.

MR. J. M. DOW proposed an omnibus vote of thanks, the Secretary, MR. W. KIRK, Greenock, acknowledging.

At the President's lunch in the North British Station Hotel, MR. COWIE welcomed Lord Mathers amongst the other guests, on whose behalf MR. W. K. TATE expressed thanks for the hospitality shown.

At the afternoon session, Mr. Alan Beaton, of Personnel Administration, Ltd., presented a paper on 'Reducing Costs by Incentives' (see p. 840).

Golf Competition

The autumn competition of the Golf Circle was played over the course of the Bruntsfield Links Golfing Society, Edinburgh, on Wednesday, September 23, when a record number of members and visitors enjoyed a day's golf in perfect conditions. The ideal weather, plus the excellent condition of this fine old course, resulted in some very good scores being handed in. The Challenge Bowl and Captain's Prize were won by Mr. C. B. S. Mitchell. The following were the prize winners:—

Winner of Challenge Bowl and Captain's Prize, C. B. S. Mitchell, 78 less 8 = 70.

SECTION I.

Second.	E. G. Smith	83 less 11	=72
Third.	B. Sturrock	83 less 11	=72
Fourth.	C. H. Angus	84 less 12	=72

SECTION II.

First.	Athol Brown	88 less 14	=74
Second.	S. C. Coubrough	93 less 18	=75
Third.	D. M. Rowan	95 less 18	=77
Fourth.	B. C. Morton	92 less 14	=78

VISITORS.

First.	W. T. Wright	78 less 10	=68
Second.	A. Beaton	90 less 20	=70
Third.	D. Pearson	86 less 15	=71

SPECIAL PRIZE FOR BEST SCRATCH SCORE.
R. Stewart 77.

The annual general meeting of the Golf Circle was held in the Clubhouse under the Captaincy of Mr. W. C. Campbell, who extended a welcome to all members and visitors. The Hon. Secretary, Mr. W. P. Rae, read apologies for absence, the minutes of the last annual meeting at Gailles being taken as read. The Hon. Secretary referred to the loss of one of their members by the death of Mr. F. R. Mitchell. It was announced that the Golf Circle membership was now 91. This included 44 gas managers and 47 traders.

The prizes were presented to the winners by Mrs. W. C. Campbell.

After being presented with the Challenge Bowl, Mr. C. B. S. Mitchell said his pleasure was very real on winning the trophy. It was only his fifth game this season, so he could only draw the conclusion that it was best to leave the game alone.

The Captain extended a welcome to the visitors who had taken part in the outing. They had had a record of 19, and he felt certain they had thoroughly enjoyed themselves. Mr. Wright returned thanks on behalf of the visitors.

On behalf of the Circle the Captain also extended thanks to the Captain of the Bruntsfield Course, which was one of the finest in Scotland. He thanked the Clubmaster and Steward of the Club for the catering arrangements and for the facilities. Mr. S. Hall said he would take the first opportunity to convey the Circle's thanks to the Bruntsfield Club.

The Captain announced that the office bearers for the following year would be as follows: Captain, Mr. L. Gardner; Vice-Captain. Mr. D. D. Melvin; Member of Committee, Mr. J. M. Dow; Hon. Sec., Mr. W. P. Rae; Hon. Auditors, Mr. D. Fulton and Mr. H. Aitken.

Mr. Campbell, the retiring Captain, presented to his successor, Mr. L. Gardner, his Captain's Badge. Returning thanks Mr. Gardner said he was conscious of his shortcomings, but he would do his best to follow the traditions set by his predecessors. A vote of thanks was moved to Mr. Campbell, the retiring Captain, for the excellent way he had carried out his duties.

Mr. Melvin and Mr. Dow returned thanks for their election as Vice-Captain and Member of Committee respectively.

Ladies' Golf Circle

The Ladies' Golf Circle held its annual competition for the Handley Salver and other donated prizes over Liberton Golf Course, Edinburgh, on September 23. The prize-winners were as follows:—

Handley Salver and 1st Handicap Prize: Mrs. D. D. Melvin.

2nd Handicap Prize: Mrs. A. Morris.

3rd Handicap Prize: Mrs. A. Brown.

Captain's Prize: Best Scratch Score, Mrs. Coubrough.

Bowling Club

There was a large attendance of members and visitors at the Granton Bowling Green, Edinburgh, on September 23, when the September Competition took place. The Bowling Trophy was won by the following rink, which was 16 shots up:

1, W. J. Edwards (Skip); 2, J. Scobie; 3, D. Philp; 4, W. Sheach.

Second prizes were won by: 1, R. Meikle (Skip); 2, F. E. Harrison; 3, J. Storrier; 4, W. A. M. Stewart, 13 shots up.

During the afternoon Mrs. R. W. Cowie, wife of the President of the Scottish Association of Gas Managers, was 'at home' to the ladies, and afterwards presented the prizes to the winners. A vote of thanks was moved by Mr. J. Wilson to Mrs. Cowie for her kindness and for so graciously presenting the prizes. Returning thanks, Mrs. Cowie said she was very happy to have had the opportunity of meeting so many of her husband's friends in the industry.

Mr. J. Couper (Leven) was elected President of the Club for the ensuing year.

Excursion

The annual excursion took the form of a visit to Hawick on Friday, September 25. Members left Waverley Station by special buffet train at 9.30 a.m., and on arrival at Hawick were conveyed by buses to the mills of Messrs. Pringle, Ltd., Lyle & Scott, Ltd., and Braemar, Ltd. The visit was of particular interest to the ladies as they were able to see the manufacture of knitwear taking place in the factories which have world-wide reputation, and which contribute so much to the dollar export drive.

After touring the mills the parties adjourned to the Crown Hotel, Hawick, for lunch, where they were welcomed by Provost Fraser.

In the afternoon a short sight-seeing tour was enjoyed, despite the break in the weather, and the company returned to Edinburgh later in the afternoon.

The reception and dance took place in the magnificent Assembly Rooms, Edinburgh, on Thursday evening, September 24. The members and their ladies were received by the President of the Scottish Association of Gas Managers, Mr. R. W. Cowie, and Mrs. Cowie, and also Sir Andrew Clow, Chairman of the Scottish Gas Board, and Lady Clow. A pleasant evening of dancing was thoroughly enjoyed by the large company.

Cooker Repairs.—Faced with an expenditure of nearly £1,000 a year on repairing electric cookers in council houses, Lowestoft Housing Committee is arranging for Electricity Board demonstrators to instruct tenants in the use of the appliances. In the post-war houses, 514 electric and 581 gas cookers have been installed and in the first six months of this year 277 repairs were carried out on the electric stoves against only 22 on the gas appliances. In one week alone, 49 repairs cost £78 and, at this rate, a year's maintenance would cost £872, which is the equivalent of a 2½d. weekly rent on all Corporation houses.

OPERATION OXYGEN

PAPER TO THE SCOTTISH ASSOCIATION OF GAS MANAGERS BY

GEORGE E. H. KEILLOR,

Airdrie District, Lanarkshire Division, Scottish Gas Board.

FOR many years it has been the established practice in gasworks to ensure in the gas stream a sufficient concentration of oxygen to effect a reasonable measure of oxidation during purification by iron oxide and thereby delay the fouling and changing of the boxes. This invariably requires the addition of oxygen to the gas stream in the form of atmospheric air, either by use of the existing 'pull' at the exhauster inlet or by means of a pressure pump at the inlet of the first or second purifier. Modern practice prefers the latter method, with measurement of air flow, and under strict control.

Fig. 1 is intended to show the relationship between grains of H_2S and volume of H_2S, also the theoretical volumes of oxygen and air required to oxidise the H_2S. The upper dotted line on the graph is intended to indicate the smaller addition of air or oxygen required for any given concentration of H_2S when the crude gas contains an initial volume of 0.2% oxygen.

An excess of oxygen over the theoretical figure is usually necessary and the extent of this will depend on the relation between the gas flow and the volume of purifying material in any particular case, modified again by the initial concentration of H_2S in the foul gas, the temperature, type and condition of the oxide. Practical experience indicates that at least twice the theoretical volume is required.

For example, there are four purifying boxes at Airdrie and they work at an 'R' of 33 in autumn and up to 44 in winter. Under favourable conditions it is possible to limit the oxygen content of the finished gas to 0.5% but it is necessary to increase this to 0.6% and sometimes even higher, when under heavy load. This would probably require 0.7% to 1.0% oxygen at the purifier inlet.

The use of air for this purpose has the inherent disadvantage of entraining 3.8 volumes of useless nitrogen for every volume of oxygen introduced. The effect of this on calorific value is portrayed in Fig. 2, and it was with this in mind many years ago, in 1934 or 1935, that I had the idea of using neat oxygen instead of air, but was not in a position to pursue the matter.

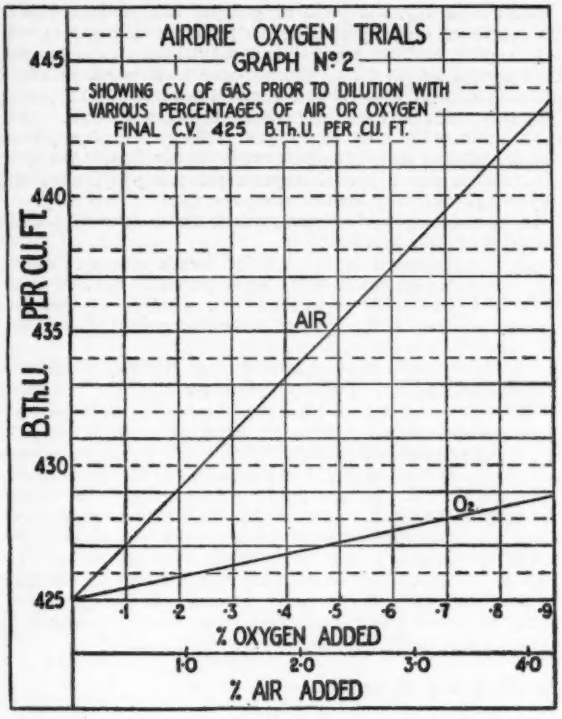


Fig. 2.

The idea recurred to me on reading some references to cheap oxygen in 'Gas Producers and Blast Furnaces,' by William Gumz, published in U.S.A. in 1950, and I was encouraged to write to the British Oxygen Co. asking

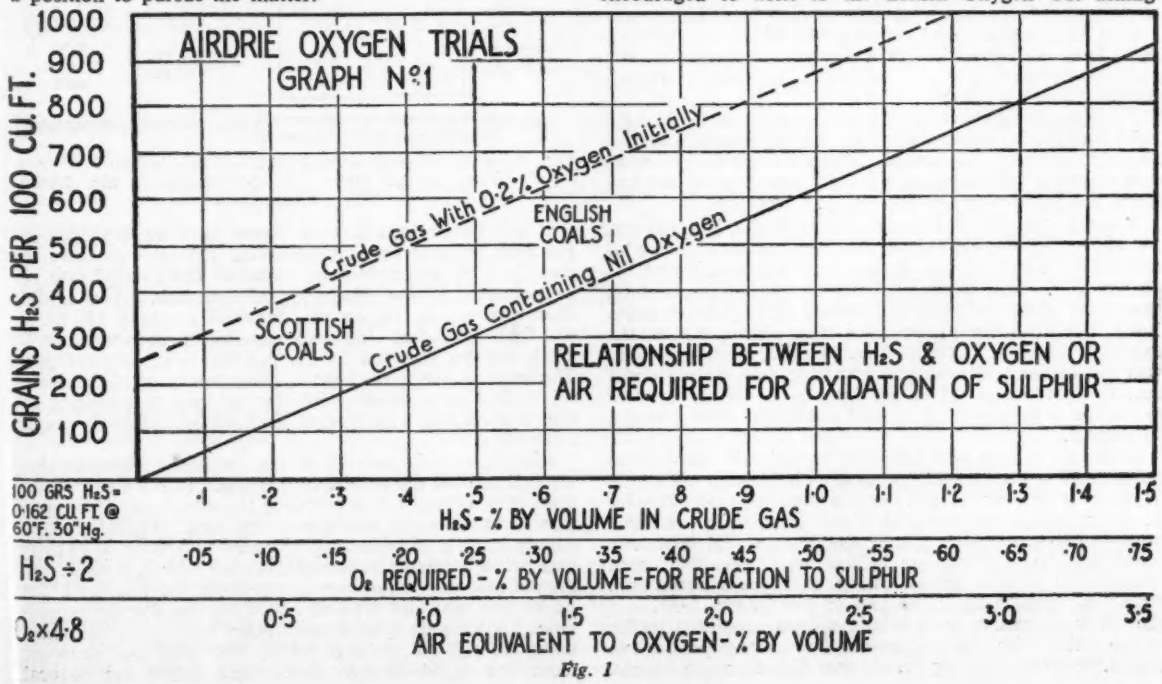

AIRDRIE OXYGEN TRIALS
GRAPH Nº1
GRAINS H₂S PER 100 CU.FT.
1000
900
800
700
600
500
400
300
200
100
Crude Gas With 0·2% Oxygen Initially
ENGLISH COALS
Crude Gas Containing Nil Oxygen
SCOTTISH COALS
RELATIONSHIP BETWEEN H₂S & OXYGEN OR AIR REQUIRED FOR OXIDATION OF SULPHUR
100 GRS H₂S = 0·162 CU. FT. @ 60°F. 30" Hg.
·1 ·2 ·3 ·4 ·5 ·6 ·7 8 ·9 1·0 1·1 1·2 1·3 1·4 1·5
H₂S - % BY VOLUME IN CRUDE GAS
H₂S ÷ 2
·05 ·10 ·15 ·20 ·25 ·30 ·35 ·40 ·45 ·50 ·55 ·60 ·65 ·70 ·75
O₂ REQUIRED - % BY VOLUME - FOR REACTION TO SULPHUR
O₂ × 4·8
0·5 1·0 1·5 2·0 2·5 3·0 3·5
AIR EQUIVALENT TO OXYGEN - % BY VOLUME

Fig. 1

whether a supply of oxygen might be available on the scale required and what the price would be. Oxygen was available and the company was willing to quote prices down to a low level for large volumes. After some consideration I got out an estimate from which it appeared that if we operated our carbonising plant normally, but used the rise in C.V. due to the use of oxygen, to produce benzole, an economic balance might be achieved.

That is to say, the yield of gas per ton of coal would be decreased only by the therms removed in the form of crude spirit, and the original declared calorific value would be restored by reason of the nitrogen eliminated. Calculations indicated that 1.5 gal. of spirit per ton of coal could be extracted, and that the revenue therefrom would more than balance the cost of oxygen. The practical application of oxygen was then discussed with the British Oxygen Co., and a short period experiment using cylinders of oxygen gas under pressure was planned as a first step.

In considering these arrangements the following points were taken into account:—

(1) The reduction in the ignition temperatures of combustible materials in an atmosphere of neat oxygen.
(2) The possibility of combustible deposits in the gas main becoming ignited near the point of oxygen admission.
(3) The measurement and control of the oxygen flow.
(4) The handling of heavy cylinders.

The first point was satisfactorily answered by study of technical data and consultation with the British Oxygen Co. The second one was dealt with by arranging for the neat oxygen to be admitted at the centre of the gas stream and parallel with the gas flow in the purifier inlet main. My opinion on these points is that the relative volumes of either air or oxygen used are so small that the element of risk is a minor one and only fractionally greater in the case of oxygen. The third point was met by the British Oxygen Co. installing suitable pressure reducing valves and gauges, and an orifice-plate flow meter with non-return valve on the oxygen supply line.

Handling the Cylinders

The last point was solved by locating the site for the cylinders below the overhead rails carrying the lifting gear for the purifier covers. By use of the existing lifting gear, the heavy cylinders, weighing 18 cwt. each, were conveniently handled from road vehicles to their positions on a temporary sleeper floor adjacent to the intake end of the oxygen pipe line. High pressure oxygen in cylinders was chosen as being the most suitable medium of supply for a short term experiment. For a permanent scheme of this kind the British Oxygen Co. indicated that a liquid oxygen supply would be cheaper.

Cylinders of 2,000 cu.ft. nominal capacity at 1,960 p.s.i. were coupled in pairs, two in use, two in reserve and two away for refilling. The reserve cylinders were so connected that a simple manipulation of valves put them on the line when the other pair showed empty.

Towards the end of October, 1951, all was in readiness, but on trying out the installation, the speed of release of oxygen from high to low pressure caused freezing of the connections. To overcome this, a heater was installed on the outlet of the cylinders and proved entirely satisfactory. Immediately on the change over from air to oxygen, the expected rise in C.V. took place. Until the benzole plant was put to work, the retort extractors were slowed down and the percentage of steam increased. When benzole extraction commenced, the retort conditions were restored to normal.

Sufficient oxygen was admitted to maintain the normal percentage in the purified gas and with benzole extraction at the rate of over 1.5 gal. per ton there was no difficulty in maintaining the declared C.V. The oxide purifiers appeared to be undisturbed by the change, and spot tests confirmed that the sulphur in the town gas had been reduced by several grains owing to benzole extraction. This trial terminated at the end of November, 1951, and the observed results were tabulated and submitted to the group office with the suggestion that a long period test should be arranged using the cheaper liquid oxygen supply. Smoothed figures for this period are reproduced in Table 1, columns 4 and 5. As can be expected, the tabulation of a few weeks' working results observed under normal works routine, no matter how carefully stocks are estimated, does not necessarily give a clear-cut picture from which to draw far-reaching conclusions. Eventually my suggestion was agreed to and a small house for the liquid oxygen storage tank was authorised and built. The British Oxygen Co. installed a tank with a capacity equivalent to 88,000 cu.ft. of gas. The general arrangement is given in Fig. 3.

The storage tank consists of a steel sphere encased in an insulated shell, with filling connection and outlet, safety valve and gauge connections. The pressure-raise coil is brought into use when the natural evaporation rate is insufficient to maintain the gas pressure. Opening the valve to this coil allows the liquid to enter the relatively warm coil and generate gas which is led to the gas space at the top of the tank, so increasing the pressure. In the case of large oxygen requirements this principle is extended by leading a pipe from the bottom of the tank so as to draw off liquid oxygen which is passed through a heater in order to gasify it.

Insulated Road Tanks

Liquid oxygen was delivered in insulated road tanks, which are now a common sight on the roads, and transferred to the site tank by gravity and the vapour pressure in the free space of the road tank. The tank filling operation is similar to that of any other liquid except that there is a greater loss of vapour (oxygen) from the receiving tank due to the relatively high vapour pressure of the liquid oxygen. The amount of oxygen received and paid for is measured from the calibrated scale on the gauge glass which shows the depth of the liquid in the tank.

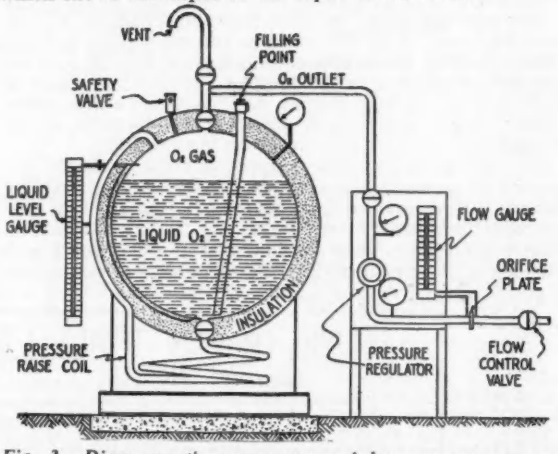


Fig. 3.—Diagrammatic arrangement of low pressure oxygen supply from storage tank. (By permission of the British Oxygen Co., Ltd.)

It will be obvious that no power need be expended in pumping oxygen since it generates sufficient pressure to flow into the gas stream by virtue of the natural rate of evaporation in the insulated storage tank. The initial charge of liquid oxygen was received on May 13, 1952, and for a period of almost six months, up to November 7, 1952, oxygen was fed to the purifier inlet continuously. The benzole plant was kept in operation most of the time, but it had been standing idle for so long that several of the fittings and instruments had become defective and misleading.

Inexperience in control of the oxygen equipment also worked against the results of this test. In the early stages there was difficulty in controlling the admission of oxygen due to variation of pressure in the tank. Liquid oxygen supply has the disadvantage of being incapable of regulation below a certain minimum draw-off and experience has proved that our requirements are about the minimum for which this size and type of liquid oxygen storage is suitable. A gaseous system can range from complete shut-down to full-on without waste, but once the draw-off from the liquid storage tank came below the natural

evaporation rate, the pressure rose until the safety valve, set at 20 lb., blew oxygen to atmosphere. The possibility of waste was greatest during periods of low gas make, such as during the fair holidays and at week-ends. Eventually, waste was practically eliminated by working the tank contents down to a low level at week-ends, and having fresh deliveries on Mondays.

As a result of our experience, it is apparent that control and measurement of the oxygen flow would be simplified if the valve to the pressure-raise coil were operated by an automatic pressure controller. The tuning-up of the benzole plant and the experience gained in operating the oxygen tank should enable the results of future trials to be improved.

The results of the six months oxygen tests are shown in Table 1, column 3, along with the results for the nine months period (column 1), April to December in the previous year, 1951. Column 2 is for a short period immediately preceding the six months test. The nine months period included the preliminary oxygen tests which are also tabulated separately in columns 4 and 5. It will be seen in column 3 that 0.515% oxygen was used, and 16.6 gal. of crude spirit were obtained for every 1,000 cu.ft. of oxygen used. At the same time the carbonising results were, for all practical purposes, normal; that is they were similar to column 1, although better than column 2.

The price of the liquid oxygen used was 14s. per 1,000 cu.ft., and the British Oxygen Co. stated that it had put forward this price based on the possible requirements of a group of gasworks. Should the use of oxygen in this, or another way, increase beyond such volumes then there would be hope of a still lower price. The average price received for the crude spirit was 1s. 8d. and as 16.6 gal. of spirit were sold for every 1,000 cu.ft. of oxygen purchased, the gross profit was 13s. 8d. per 1,000 cu.ft. of oxygen used. This balance has to provide for the operating costs of benzole production and for the net cost of the small amount of additional coal used. The reduction in the sulphur content of the gas should also be allowed as a credit. This might be substantial if an activated carbon plant were in use for benzole extraction.

Financially, I believed the experiment had paid its way, and for purposes of further comparison and to ascertain whether, as I believed, still better results could be obtained, I asked and was granted permission to carry out a further trial in the summer of 1953. Enough has been done in the 1953 trial to prove that benzole of a better quality can be made. The price expected is now 1s. 11d. per gal.

Fig. 4, which is based on West's Steaming Curves, illustrates the theory of the expected changes in calorific value and gas yield under various conditions of plant operation —*viz.*:—(a) use of oxygen with debenzolisation; (b) normal conditions with use of air; and (c) use of oxygen with extra steaming or blue water gas.

In comparing the results obtained with and without oxygen against the theoretical plotting on Fig. 4, it appears that practice has improved on theory because rather less oxygen was used than would have been expected, and the benzole yield expressed in therms is greater than the drop in the net thermal yield of gas. A similar divergence between theory and practice was commented upon by Henshaw and Cooper in reference to benzole extraction in their paper to the I.G.E. in June, 1940, and an endeavour will be made to clarify these points during the 1953 experiment.

If economy in consumption of gas coal were the only criterion, then the use of oxygen without benzole extraction would permit a very considerable saving, by increasing the scope for steaming or adding B.W.G. According to the graph the yield of gas per ton of coal could be increased by about 1,170 cu.ft. with, of course, a smaller coke yield which unfortunately makes this method uneconomic financially.

Again, the use of oxygen instead of air would be an advantage at times when the oxide purifiers required a high concentration of oxygen to maintain the gas free from H_2S. At such times the O_2 content of the gas stream could be increased to 1.5% or 2% without serious effect on the calorific value. Using air at the higher figure would make it almost impossible to maintain the declared calorific value.

When using neat oxygen which is relatively expensive, one naturally limits the amount, whereas with the use of air it is fatally easy to 'put a bit more in.' In the case of steamed vertical retorts the possible yield in therms per ton of coal is influenced to an extent perhaps not generally realised, by the amount of air admitted. For example, let us assume that 0.5% oxygen is the practical minimum in the finished gas. Now suppose air is admitted so that the percentage of oxygen in the purified gas is 1.0, then the degradation of the C.V. would be 2.4%. In the case of 425 B.Th.U. gas this would amount to 10.2 B.Th.U. but, as the declared C.V. must be maintained, the retorts have now to make gas at 436 B.Th.U. On referring to West's Steaming Curves, the drop in gas yield would be nearly 1,500 cu.ft. per ton. Likewise, the amount of oil required for carburetting a diluent gas such as C.W.G. is considerably affected, but whether for verticals or C.W.G. the evils of excessive degradation of C.V. are greatly reduced by admitting oxygen to the gas stream instead of air.

While it has been known for many years that air admission should be at the purifiers and not on the inlet side of the exhauster, many small works and perhaps a few bigger ones still adhere to this undesirable practice. Effluent troubles if nothing else should cause every gasworks to inject air (or of course oxygen) at the first or second purifier and carefully seal off and supervise all air intakes or in-leakages on the suction side of the exhauster.

TABLE 1

	1 Mostly air	2 Air only	3 Oxygen only	4 Prelim. trials incl. in col. 1	5
Period of run—start	1/4/51	1/4/52	13/5/52	29/10/51	12/11/51
end	31/12/51	11/5/52	7/11/52	11/11/51	25/11/51
Length of period	39 weeks	6 weeks	25 weeks	336 hours	336 hours
Period of air admission	36 weeks	6 weeks	Nil	133 hours	30 hours
Volume of oxygen added cu. ft.	225,600	nil	1,039,000	90,000	120,000
Coal carbonised, tons	18,208	2,686	11,151	954	1,021
Oil gasified, tons	8	1	2	0.8	Nil
V.R. Gas made at S.T.P. cu. ft.	335,781,000	48,539,000	200,603,000	17,919,000	18,448,000
C.W. Gas " " "	2,611,000	284,000	1,133,000	299,000	Nil
Total mixed gas made, cu. ft.	338,392,000	48,823,000	201,736,000	18,218,000	18,448,000
% C.W.G. made	0.75	0.6	0.56	1.6	Nil
Coke, saleable cwt. per ton of coal	7.82 } 9.14	7.35	8.02 } 9.28	7.8	7.8
Breeze, " " " " "	1.32 }	1.23	1.26 }	1.6	1.4
Tar, " gal. " " "	17.6	17.9	17.7	17.8	17.5
Benzole, " " " " "	0.14	0.04	1.55	Nil	1.69
Therms due to benzole per ton of coal	0.2	0.06	2.32	Nil	2.53
" " " gas	78.6	76.50	76.80	80.2	76.88
Total therms in gas per ton of coal	78.8	76.56	79.12	80.2	79.41
% Oxygen to gas made	0.07+ air	air only	0.515	0.494+air	0.65+air
Gal. benzole per 1,000 cu. ft. O_2	Nil	Nil	16.6	Nil	14.4

The investigation I have made has focused attention on methods for determining the oxygen content of town gas and I suggest that the normal gas analysis apparatus leaves something to be desired when it comes to estimating the oxygen content. I have had one of my Orsat burettes modified so that the calibrated part of the burette is very narrow and readings may be taken accurately to 0.05% whereas normally there are lines marking every 0.2%. In

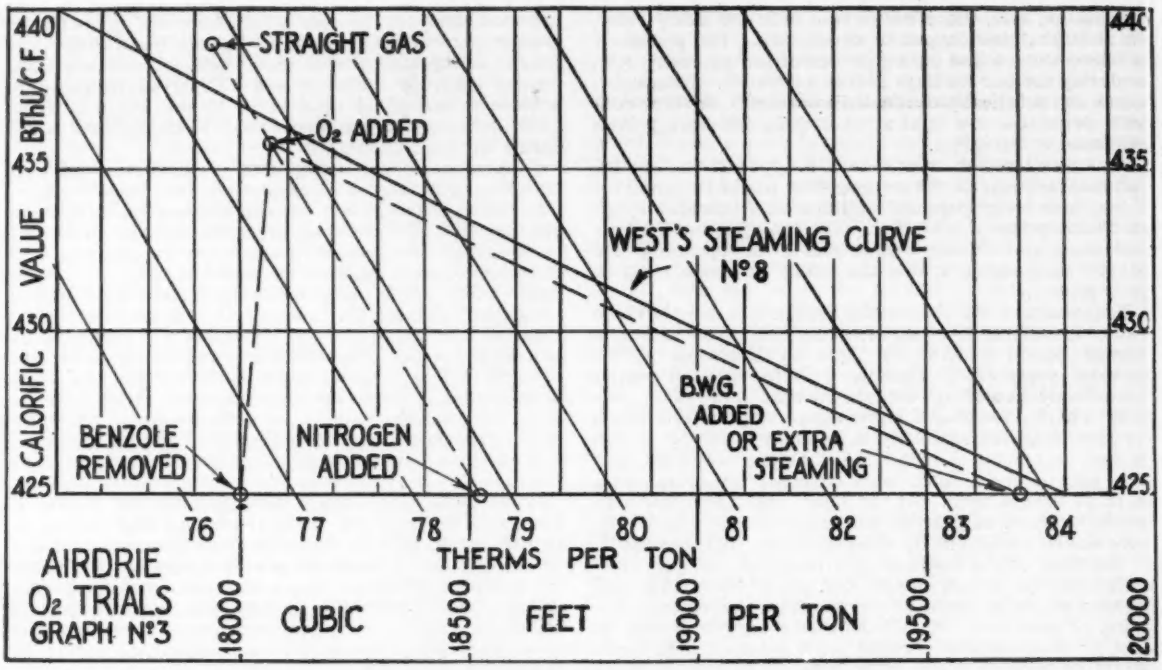


Fig. 4.

this type of burette it is only possible to estimate the CO_2 and O_2, but these are the two constituents most frequently required for plant control purposes in the smaller works. A recorder for oxygen content of town gas seems to me to be an instrument which would pay its way in the larger works and several makes of instruments are now available.

Many engineers are now using producer gas, and flue gas to dilute rich coal gas and it makes one wonder whether they will some day advocate the late George Helps' theories. This paper may read strangely to them since I am trying to show an advantage through *excluding* an inert gas from the process. Since the capital costs of new distribution systems have become so great, we should not agree too readily to accept inerts and a lower Wobbe Index which reacts unfavourably on distribution costs.

Regarding the safety of the liquid oxygen installation I understand that such plant has been in service for over 20 years and is in regular and increasing use in many industries. For example, steelworks may have a battery of liquid oxygen tanks, and my own experience suggests that gas plant, steam boilers and steam mains are a greater potential risk than oxygen plant. Liquid oxygen is at low pressure, from 5 to 20 lb. per sq.in., and contains no fire risk in itself. When oxygen is released to the atmosphere it is relatively harmless. Should it encounter anything which is burning, the rate of combustion would be increased. With suitable precautions of an elementary nature there is no practical reason for excluding oxygen plant from a gasworks.

Under the circumstances existing at Airdrie where there is a benzole plant already installed and surplus carbonising plant available during the summer, I am satisfied that the elimination of atmospheric nitrogen plus debenzolisation is economic during the off-peak period. In this way the question of capital charges does not arise and calculations may be confined to operating costs and revenue. There must be other works where these factors are present and where similar tests could be run. The Airdrie benzole plant uses gasholder water for cooling purposes and the pumping cost is estimated to be equal to the cost of pumping air into the purifiers.

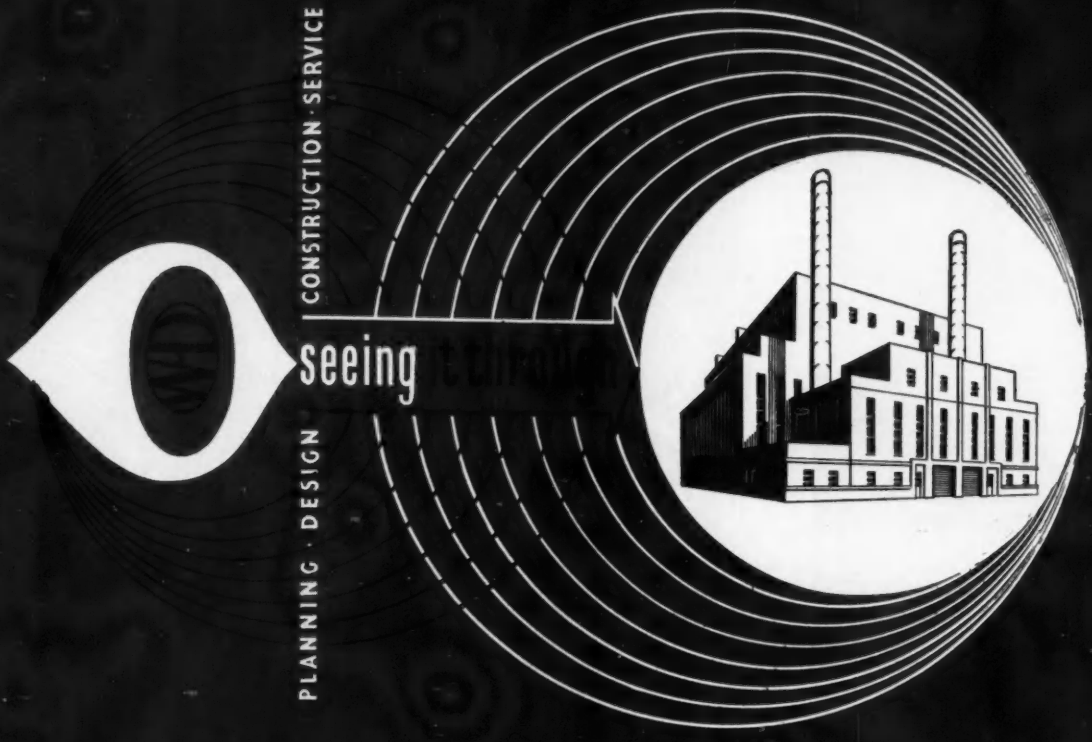
While it is not denied that benzole extraction without the use of oxygen might result in a greater profit, the repercussions on coke yield and coal requirements would generally be embarrassing, even if the calorific value of the gas could be maintained.

TABLE 2

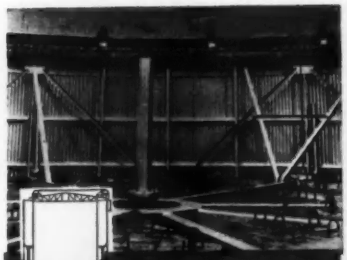
AIRDRIE OXYGEN TRIALS — Compiled June 16, 1953

Comparison of three methods: Air, Oxygen and Benzole, Air and Benzole, accounting for variable factors only.
Plant: 16-50 in. G-W Retorts. Period: 30 off-peak weeks, mid-April to mid-November.
Gas Make: 8 mill. cu. ft. per week = 34,000 therms. Total for period 240 mill. cu. ft. = 1,020,000 therms, at 425 B.Th.U.
Prices: Coal, 76s.; Coke, 85s.; Breeze, 25s.; Tar, 6d.; Benzole, 1s. 11d.; Oxygen, 14s.; Steam, 8s.

Item	Air		£	Oxygen and Benzole		£	Air and Benzole		£
1. Gas yield, net	18,529 cu. ft. 78.75 therms			18,000 cu. ft. 76.5 therms			16,939 cu. ft. 71.97 therms		
2. Coal required	12,953 tons		49,221	13,333 tons		50,665	14,168 tons		53,838
3. Air cost (blower)	20s. per week		30	—		—	20s. per week		30
4. Oxygen cost	—		—	—		840	—		—
5. Water cost (ex gasholder)	—		—	20s. per week		30	20s. per week		30
6. Wash Oil and maintenance of Benzole Plant	—		20	1½d. gal. benzole		129	1½d. gal. benzole		137
7. Purification and plant upkeep	6s. ton coal		3,885	6s. ton coal		4,000	6s. ton coal		4,250
8. Total of expenses			£53,156			£55,664			£58,285
9. Coke, for sale	7.8 cwt. per ton	5,052 T.	21,471	7.9 cwt. per ton	5,267 T.	22,385	8.5 cwt. per ton	6,021 T.	25,589
10. Breeze, for sale	1.3 cwt. per ton	842 T.	1,053	1.3 cwt. per ton	867 T.	1,084	1.2 cwt. per ton	850 T.	1,063
11. Tar, for sale	17.7 gal.	229,268 G.	5,732	17.7 gal.	235,994 G.	5,900	16.0 g.p.t.	226,688 G.	5,667
12. Benzole, for sale	Nil		—	1.55 g.p.t.	20,666 G.	1,981	1.55 g.p.t.	21,960 G.	2,105
13. Steam yield, net		6,216 T.	2,486		5,801 T.	2,320		6,160 T.	2,464
14. Total of revenue			£30,742			£33,670			£36,888
15. Net cost	(Normal practice)		£22,414			£31,994			£21,397
16. Difference in cost				Balance in favour		£420	Balance in favour		£1,017
17. Coal and coke tonnages	Normal			Coal up 3%;		Coke up 4.3%	Coal up 9.5%;		Coke up 19%



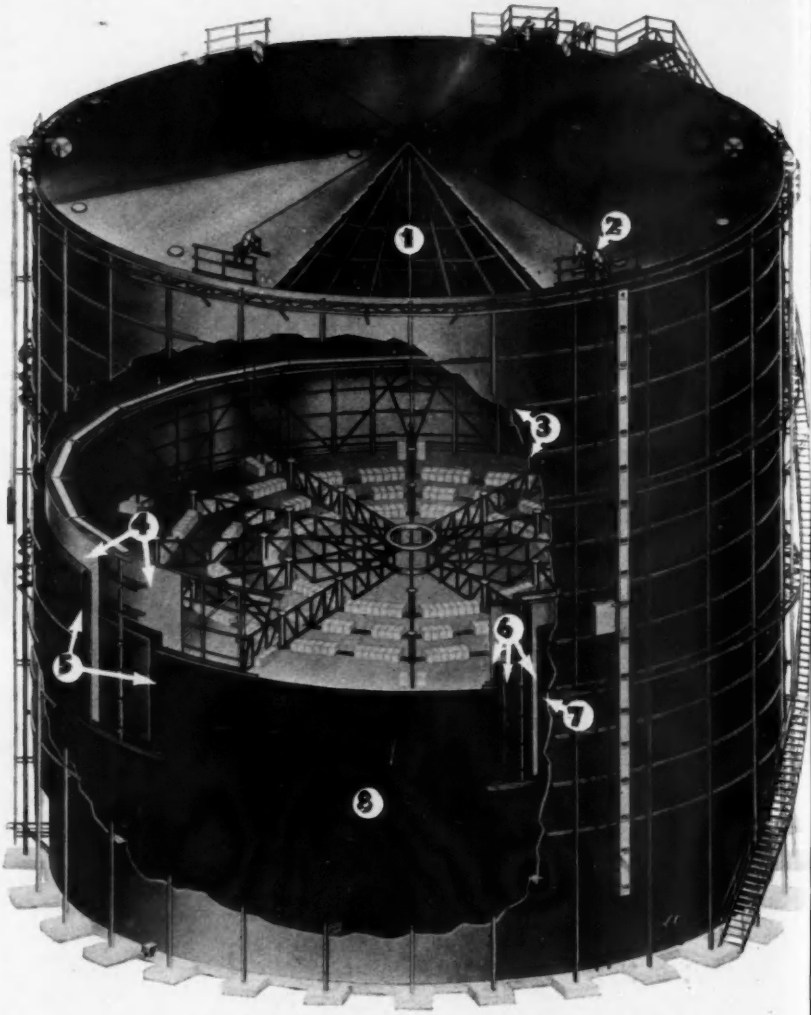
WOODALL-DUCKHAM



EMPTY, showing top of piston and corrugated fender. Note weights on top of piston to regulate pressure

HALF FULL position, showing inflated seal constructed of a synthetic rubber coated fabric

FULL position, view of mechanically operated relief valve. Releases gas if holder capacity is exceeded



Features of the WIGGINS Dry Seal Gasholder

The Wiggins Gasholder operates on the principle of piston displacement. A frictionless, movable piston floats on the confined gas, rising and falling with changes in volume. The seal—a synthetic rubber-coated fabric—is protected against wear by ample clearances. The system requires practically no maintenance and no replacements. The Wiggins Gasholder is a structure free of unsightly framework.

1 The piston rises nearly to the roof of the shell giving maximum capacity.

2 A single automatic levelling device keeps the piston riding level.

3 The section of the shell above the piston is completely ventilated.

4 Wide clearances prevent friction.

5 The gas-tight seal remains unaffected by weather.

6 Fenders protect the seal when under pressure and guide it on to the side walls without friction.

7 The shell is gas-tight up to the seal connection.

8 Foundations are simple and inexpensive as only the shell weight has to be supported.

Wiggins

DRY SEAL GASHOLDER

Wiggins Gasholders are being used for the storage of hydrogen, nitrogen, towns gas, carbon monoxide, carbon dioxide, oxygen, coke oven gas, tetrafluorethelyne and sewage digester gas, etc.

ASHMORE, BENSON, PEASE & CO.

ABP

STOCKTON-ON-TEES & LONDON

AUSTRALIA, CANADA FRANCE, INDIA, SOUTH AFRICA

The oxygen alternative offers a middle course method of improving the annual plant load factor at a profit, it reopens the way to benzole content of our gas.

Although I had not intended at this stage to produce a balance sheet comparing the results with air against those with oxygen I have been asked to do so, and therefore include Table 2, which is an attempt to bring the financial aspect into focus. Three sets of figures give estimates for normal working with air, benzole extraction with oxygen, and as a matter of interest, benzole extraction with air. The figures which are based on prices ruling at June, 1953, are not intended to represent the whole cost of gasmaking, but only that part which is affected by the technique described in the paper. If my figures are found to be acceptable it would seem that the use of oxygen can be justified.

When this project was first considered I had no knowledge of the prior use of neat oxygen in connection with purification, but the technical officers of the British Oxygen Co. provided several references with a bearing on the subject. One reference was reported from Flixborough where surplus commercial oxygen was available and was used instead of the normal air. Luzern gasworks was reported to have piped commercial oxygen into their purifying plant and that the resultant cost was negligible.

I have since then surprisingly come across a reference to the use of pure oxygen in the eighth edition of Newbigging's Handbook dated 1913. He dismissed the idea with the remark that its cost was prohibitive.

It should be noted that no additional staff were available for these tests and the work had to be taken in stride by the existing staff to whom I am indebted for their interest and help. I am sorry that it was not possible to take all the tests, analyses, etc., which an experiment of this nature requires, and I can only hope that the trend of the results is discernible and provides a pointer to future possibilities.

DISCUSSION

Mr. W. C. Campbell (Paisley), opening the discussion, said it was not improbable that Mr. Keillor saw many advantages arising from the use of oxygen in place of air for revivification purposes, not only on the production side but particularly on the distribution and utilisation side of their business. Assuming an average inert content of town gas of some 15% (of which some 4% was represented by the nitrogen arising from air entrainment for revivification in purifiers), Mr. Keillor no doubt realised that of the 450 million cu.ft. of gas sent out from Airdrie gasworks, some 60 mill. of the bulk consisted of inert gases which cost money to distribute, reduced utilisation efficiency, and created no revenue. Mr. Keillor would appreciate also that his process plant capacity was being reduced by the bulk of these inert constituents in his gas.

'I feel that he approached the problem in an honest effort to reduce his costs, but to justify the initial cost of oxygen he attempted to produce revenue by extracting benzole and, by so doing, my impression is that he confused a clear-cut issue. Would it not have been sufficient for him to have used oxygen in place of air, thus eliminating some 4% of the inert constituents of his gas, and re-declared his calorific value at 440 B.Th.U. per cu.ft? It may be that the cost of oxygen compelled him to try to find a source of revenue to offset the additional charges. I suggest that it would have been better for him to have attempted an assessment of the savings liable to accrue from the straight elimination of 4% of the inerts in his gas. The fact that Mr. Keillor introduces the highly controversial subject "Does Benzole Pay?" is unfortunate, because it suggests that he was not prepared to support a case in favour of a refinement process which would produce a better gas, of higher calorific value, and lower specific gravity.

'As part of our normal process of manufacture, we extract ammonia and H_2S, and the charge thereof is a direct one against production costs. These constituents must be removed from the gas on the one hand, but I suggest that, on the other hand, it has never been clearly proved that the introduction of air for revivification purposes does not create, or at least increase, troubles due to gum formation. Would not the straight cost of oxygen have been offset by these advantages which I have mentioned?'

Without ever appreciating the full implication of the matter he had understood for very many years that a cheap source of oxygen would revolutionise the carbonisation industry in general and revitalise the gas industry in particular. Cheap oxygen was to take the place of air in the gasification process and one wondered if they were any nearer the attainment of cheap supplies of oxygen. Whether or not a demand arising from the use of oxygen in the purification process would create lower production costs, he was not aware. Mr. Keillor had been looking into the question of oxygen prices and he wondered if he could give them an idea of what the price of oxygen would need to be to enable its use for, say, complete gasification. Could the gas industry contribute to the production of cheap oxygen by purchasing the very substantial quantities required for the purification process? For example, to use oxygen in place of air throughout the area of the Scottish Gas Board would require 300 mill. cu.ft. of oxygen per annum. At the prices quoted by Mr. Keillor it would cost £210,000, roughly equivalent to 1d. per 1,000 cu.ft. of gas sold.

He proposed to hand to Mr. Keillor figures which he had extracted from his paper, purporting to show his balance-sheets, as shown in Table 2, in what he considered to be a truer light. For example, he could not appreciate why he did not take into consideration the varying therms of gas produced under the three tables as revenue from each ton of coal carbonised. Applying the author's figures to the simple case of products from each ton of coal, he found that the best net balances resulted when he ran the plant in the normal way, as shown in Table 2, Col. 1. He found that the F.E.I. in each of the three cases was approximately the same at 22% or thereabouts. When that state of affairs existed—*i.e.*, when no improvement in fuel expenditure resulted from a change in method—it might not pay to increase coke production at the expense of gaseous therms. However, he thought it was generally agreed that benzole recovery paid when coke commanded a higher price than the price of coal and when the F.E.I. improved as a result of the practice.

Benzole and C.V.

Mr. C. B. S. Mitchell (Kilmarnock) said that the idea of using neat oxygen in place of air for the revivification *in situ* of the oxide in purifiers was a good one technically from the point of view of keeping down the total inerts, but it left one with the problem of the best thing to do with the resultant rise in calorific value. At Airdrie, Mr. Keillor was fortunate in having a benzole plant which he was able to bring into operation, and it was obvious from his paper that the economy of the experiment was dependent on that factor. Had there not been a benzole plant, Mr. Keillor would have been faced with a choice of alternatives, either to increase the degree of steaming in his continuous vertical retorts or reduce the amount of oil to the carburettor of his water gas plant, if one was available. As he demonstrated in his paper, increasing the steam to the retorts as a means of reducing calorific value to the declared standard reduced the amount of coke available for sale to such an extent that the overall economy of the process showed a debit balance. It was obvious, therefore, that there were so many contributory factors involved in the use of neat oxygen, such as ready coke market, type of carbonising plant in use, availability of benzole plant, water gas plant, etc., that its use must of necessity be confined to only a very few of the larger undertakings.

If one was concerned solely with the reduction of inerts, he would suggest that another avenue to explore was the one involving the complete elimination of CO_2, which could be removed very readily by passing the gas through a catch-box containing lime. That might appear to be a retrograde step, since lime purification fell into disuse with the advent of oxide of iron. There were the physical considerations connected with the handling of the spent lime, but that should not present the same difficulties as it did in the days when it was used for removing H_2S, as the end product resulting from the removal of CO_2 would only be calcium carbonate. The removal of 5% to 6% of CO_2 usually present in town gas would result in an increase in calorific value of 20 to 25 B.Th.U., but here again one was faced with the problem of how to cope with the rise in calorific value.

Mr. Keillor's experiments were most enlightening and provided the answer to those of them who had previously pondered the idea of reducing inerts by using neat oxygen or any other means towards the same end. They were grateful to him for the time and trouble he had taken to record the results of his efforts for their benefit.

Mr. E. H. Jones (Haddington) said the experiments which Mr. Keillor had carried out at Airdrie could contribute to an improved technique in gas manufacture and purification, assuming, of course, that the substitution of neat oxygen for air to revivify oxide *in situ* was proved to be economical. Mr.

(*Continued on p. 839*)

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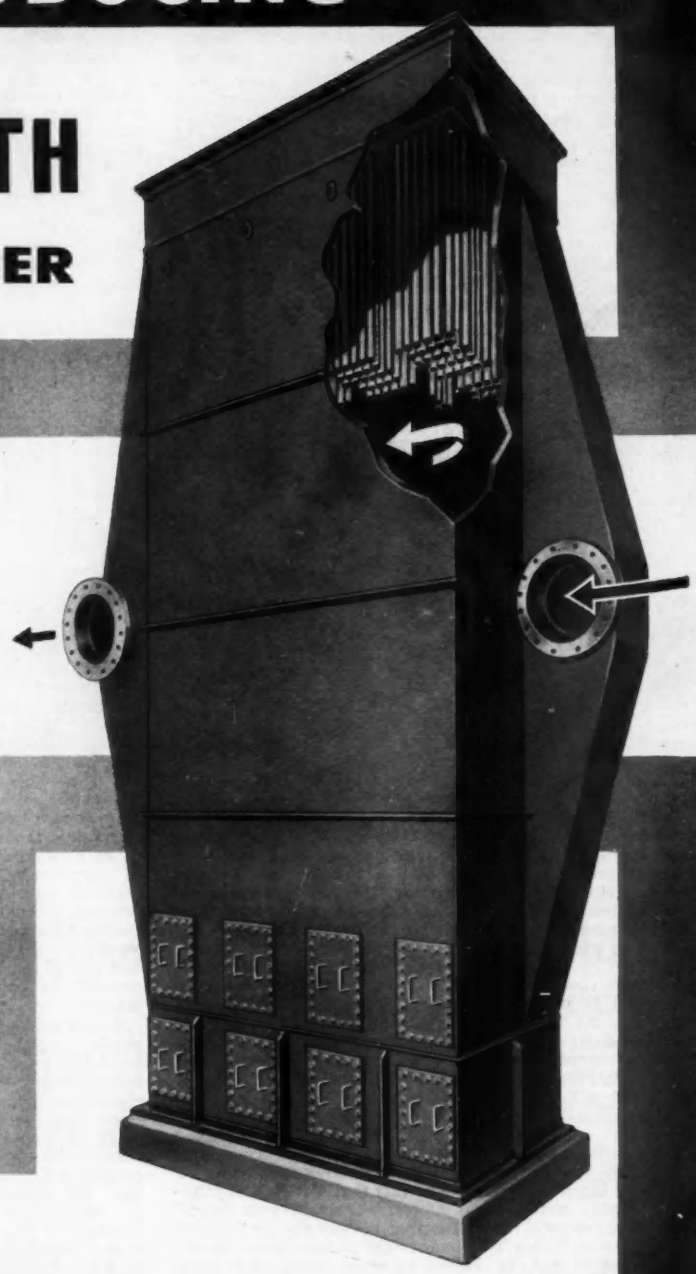

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Keillor had given cost summaries using (1) air alone, the normal practice; (2) oxygen with benzole extraction; and (3) air with benzole extraction. It would appear that the most profitable combination of these three was the use of air in conjunction with benzole recovery. The reason for the favourable balance using this combination was, of course, due solely to the increased coke for sale figure, credited at a high selling price. Presumably, if the benzole plant had been capable of extracting, say, 2½ gal. per ton there would have been a still more favourable balance-sheet, as a further increase in saleable coke would be obtained, due to the necessity to produce a gas of about 445 calorific value at inlet to benzole plant.

That was the sort of balance-sheet presented during the war by the Ministry concerned, as an inducement to gas managers to install a benzole plant. It was, in fact, a financial statement in favour of benzole recovery.

Influence of the Coke Market

By comparison, the use of oxygen along with benzole recovery appeared relatively unfavourable. That, however, was only on paper, for it was fairly true to say that most undertakings had uncomfortably high coke stocks at present. What, then, was the point of such undertakings producing a higher coke yield and a proportionately smaller number of gaseous therms per ton merely to show on paper a reduction in the cost of gas into the holder? The calculated cost of gas into the holder could be a reasonably accurate pointer to the financial side of works operation, but only if the coke and breeze available for sale were, in fact, sold as they were made. It was largely for that reason that he suggested that the application of Mr. Keillor's experiments which might be found of most value at present was the use of oxygen for revivification but without benzole recovery. That would provide an improvement in purifier operation, yielding a final gas with reduced inerts. It produced, as Mr. Keillor indicated from West's Steaming Curves, an additional 1,170 cu.ft. of gas per ton and it conserved coal, while the reduced coke yield would narrow the present gap between the availability of coke and actual coke sales. He would suggest that by that means the use of oxygen alone to revivify oxide in purifiers could be made to pay in actual revenue more so than on paper.

When coke demand increased beyond coke availability then they said by all means incorporate benzole recovery, or even incorporate the admission of coal gas into the producers. Either of these methods would profitably create extra coke when increased sales required it.

The greatest value of Mr. Keillor's investigations lay in the flexibility of plant operation provided by his several alternatives. Properly applied, any technique giving a manager flexibility to operate his plant to suit changing markets and conditions was necessarily progressive and profitable.

A Question of Economics

Mr. D. Beavis (Edinburgh) said it seemed to him that Mr. Keillor had proved that he should give up the use of oxygen for revivification *in situ* and pursue benzole extraction. His own figures in the concluding table showed a profit of over £1,000 when using air and producing 1½ gal. of benzole, against £420 using oxygen and producing a similar quantity of benzole. It was unfortunate that the author had introduced the question of benzole at all. The question surely was whether it was cheaper to employ oxygen or air for revivification *in situ* to yield a given calorific value of purified gas. The use of oxygen permitted the calorific value *ex* retort house to be reduced by a few B.Th.U. per cu.ft. The fundamental consideration now emerged. Was it cheaper to produce a therm of gas *ex* retort house at this lower calorific value and was the saving, if there was one, enough or more than enough to offset the cost of the use of oxygen? He would suggest that since the author himself had demonstrated that greater economy was possible with air when producing benzole no such saving accrued.

Mr. Keillor's paper did, however, pinpoint one very important problem facing their industry, and that was the question of the most economical calorific value to produce gas in the plants at their disposal. That problem pressed more upon them as integration proceeded. It was a difficult one and there were many factors to be considered. A recent examination of it in Edinburgh suggested that there was little to choose in the cost per therm from vertical retorts in Scotland over quite a wide range of calorific values, but more accurate information about the influence on plant output, yields of coke and breeze, together with repercussions on distribution problems, would be required before a conclusion could be drawn. He congratulated the author on putting his theories to the test. There had been too many theorists in recent years and too few practical experiments. It was a pleasure to have a paper presented by one who had put his theories to the test, even if he did not agree with the author's conclusions.

Mr. J. M. Dow (Lanarkshire Division) said he was more interested in saving coal than in making benzole, and would suggest how it could be done. At the present time the Scottish Gas Board purchased between 100,000 and 150,000 tons of English coal, costing about £1 per ton above the average Scottish price. According to his calculations—and his figures did not agree with those of Mr. Campbell—it cost 10½d. per ton in Airdrie to use oxygen, equal to ¼d. per 1,000 cu.ft. It cost the Board a great deal of money to buy the English coal but by using oxygen they could make an extra 5 therms per ton. The Board's bill for English coal was twice the saving which could be effected. It was something which should be looked into.

Coal/Coke Price Ratio

Mr. Keillor said he had been asked why he confused the issue between oxygen and benzole. He had to watch his annual estimate and he tried not to increase his costs or add to the expense. It was perhaps right to say that their coal-coke price ratio was more favourable at Airdrie than elsewhere. The price of coke throughout Scotland was very little greater than the price of coal, but in Airdrie they had had a difference of 9s. per ton. It might be that in Airdrie it would pay them to go out for a saving in coal. The only way he could see to obtain permission to carry out his tests on a paying basis was to produce benzole. He was one of those who believed in benzole, and while the production of benzole depended on coke sales he would say that coke had not its right place in their policy. It was wrong that they should not be able to make and sell coke when coal was scarce because, in his view, it was a better fuel. Many people would agree and something more should be done to secure for coke a place in the national fuel policy so that they could produce a smokeless fuel and work their plant with more flexibility. The country needed benzole but it also needed coke. That was why at Airdrie they chose the benzole way of doing it because they could keep the costs down and make a profit. Why was it that so many of the undertakings in the South produced benzole? Why did the coke ovens produce it?

Mr. Keillor said that Mr. Campbell's figures were interesting and he would study them and see if his arithmetic agreed with his own. He could not agree with Mr. Campbell when he said that the use of air was the most economical method.

Referring to the price of large volumes of oxygen, Mr. Keillor said he did not claim to be an authority on the subject. He had put things forward as he had found them. When they came to complete gasification they came to what was called tonnage oxygen production. In Airdrie they were using pure oxygen, and he understood that tonnage oxygen was 95% pure. That was a different field. Large plants would be required and large capital expenditure. The use of oxygen in small quantities had no relationship to the use of tonnage oxygen, the price for which might be as low as 6s. per 1,000 cu.ft. Although he had taken the price at 14s. per 1,000 cu.ft., it was possible that the price might come down to 10s. if enough was being used. Again, if the prices of raw materials, tar, coke, etc., changed the whole picture might alter. He understood that there was no limit to the amount of oxygen which could be supplied.

Mr. Beavis had asked why they did not increase the calorific value of their gas at Airdrie. The answer was that it would not have produced any extra revenue. He had to find a way of carrying out his experiments on an economic basis.

Uses of Tin

THE September issue of *Tin and Its Uses* contains a well-illustrated article on the work of the corrosion laboratories at the Tin Research Institute, and explains how test methods are devised to simulate practical conditions. A recent patent application covers the addition of organotin compounds to enamels of the chlorinated rubber type; enamels with this addition have enormously longer life.

The same organotin compounds are the preferred stabilisers for polyvinyl chloride type plastics against deterioration during compounding and processing and during service. An article discusses their value in extruded P.V.C. pipes, which are now making great headway in the food and chemical engineering industries and also for domestic water services in some places.

Tin-zinc alloy electroplate, a novelty 10 years ago, is now a well established protection for steel surfaces, especially in radio and aircraft equipment for the fighting services. An example of how intricate soldering operations can be mechanised is given in an illustrated article on the soldering of car thermostat bellows. The world's tinplate production capacity is referred to in an article on the statistics of tins and cans.

REDUCING COSTS BY INCENTIVES

PAPER TO THE SCOTTISH ASSOCIATION OF GAS MANAGERS BY

ALAN BEATON,

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AS the title of my paper suggests, it is not my intention to comment on the wealth of technicalities which surrounds gas manufacture, but rather to discuss new management techniques and the way in which they can be used to help to improve the functional efficiency of the gas industry. Here I feel we are on common ground, as I understand the majority of those here today are executives with responsibility for manufacture and distribution and, therefore, directly concerned with the cost of the gas which they sell. It is with this latter aspect that I shall be most concerned, for it is my intention in this paper to examine ways and means by which costs can be reduced and subsequently controlled.

Most accountants will confirm that the basic elements of cost in any product are labour, material, and overheads. Gas is no exception and I propose to examine these elements individually in more detail.

Labour Costs

First let us consider labour costs. It is my opinion that there is only one practical method of reducing labour costs and that is by increasing the rate per man hour at which work is done; in other words, by increasing productivity. This term productivity has become almost a national slogan in the last decade, but is still too often used as an exhortation without its implications being fully understood. It is often suggested, for example, that the introduction of mechanical aids and equipment will result in increased productivity and reduced costs. Unfortunately this result is by no means automatic as current evidence in the coal industry shows only too clearly. Or again, to quote the report of the Anglo-American Productivity Team on Gas: 'There was a readiness in America to introduce mechanical appliances to reduce manual work. There is no evidence, however, that this greater mechanisation has increased productivity.' It is evident then that something more than pure mechanisation is needed if productivity is indeed to be increased. It is my opinion that the most effective way of achieving and thereafter maintaining a high level of productivity is the application of incentives based on work measurement. I would go further and say that incentives are even more important when mechanical aids are being used if the expected return on the capital investment is to be assured.

Work measurement is no new conception. We are all familiar with other units of measurement in everyday use; for example, pounds of weight, feet as a measurement of length or more appropriately, perhaps, therms of gas. The one factor which presents a problem to most of us is the unit to be used as a measure of human effort or labour. Time by itself is not sufficient, as can be seen from the following illustration. The output of a mains laying squad is usually expressed in yards or in pipes laid per hour or week, but whether or not any given output obtained for a particular week indicates a high or low level of productivity cannot be answered by reference to yards or pipes unless compared with a predetermined standard, since the size of the pipe and the terrain will affect the amount of work involved per yard of installation. Clearly, what is required is a measure for the expenditure of labour per unit of output and it is for just this purpose that the conception of a work unit has been established.

Work and Rest

Instead of measuring output in terms of pipes laid, output measured in work units provides a true indication of the amount of work or effective effort supplied by an employee or group of operatives, in carrying out a particular function. Thus, an efficient secretary typing letters can be considered as producing the same number of work units of effective effort in a given time as, for example, a pipelayer or a caulker. The kind of output and the physical energy required in each case are, of course, completely different, but the work units produced can be considered to be the same provided that the same amount of effective effort is being expended in each case to bring about an efficient result. It will be clear that the enormous variety of work carried out makes varying demands on physical and nervous energy. All work is fatiguing to a greater or lesser extent and appropriate allowances must be made for this. Therefore, the work unit is made up of two parts—work and rest. It will therefore be seen how a unit built up in this manner can be universally applied over the whole range of industrial endeavour since the proportion of effective work and rest may be varied from extremes of, say, 50 min. of work and 10 min. of rest per hour for a woman on very easy tasks, to 30 min. of work and 30 min. of rest per hour for a man under arduous conditions of heavy manual labour.

The 'Work Unit'

This work unit is usually termed a 'standard minute' and consists of part of a minute of actual work and part of a minute for rest. The rest allowance for particular jobs is built up from an analysis of the strains involved and the minutes of work from time studies in which the working time is corrected by a factor for effective effort. Such a universally applicable unit for the standard measurement of work output is just as essential as the other units of measurement which are in everyday use. Such units of work can be used not only as a quantitative indication of capacity, but also as a means for measuring productivity and as a basis for incentive payment. In industry today not only does management require a unit of work measurement to determine the real capacity of its labour force, but the workman also requires and is entitled to the use of a standard work unit for the accurate measurement of the consumption by the employer of his or her output.

This then, is the character of the unit of work and while this is not the time to go into the technicalities of production study, I would like to stress that the technique used to determine the work units necessary for carrying out any particular operation is an impartial, objective, fact finding procedure involving a most painstaking regard for accurate perusal of the situation. Frequently in the course of determining the work units necessary for carrying out a particular job the presence of undesirable conditions, faulty equipment, or poor organisation is disclosed, but the result is to ensure that the standards of performance eventually laid down are not only accurate and fair but also represent the best practice possible under ruling conditions.

A Popular Misconception

At this juncture I would like to correct a popular misconception regarding the type of tasks which lend themselves to detailed production study. A number of people still feel that the technique of work measurement can only be applied to repetitive functions of short duration, such as making chocolate drops or conveyor line assembly of radios. This is quite untrue. Production study techniques have developed greatly in the last quarter of a century and in just the same way as the gas industry has moved from the old type horizontal to vertical retorts, the process of work measurement has been developed and successfully applied to such widely divergent functions as jam-making and shipbuilding. I might also add that the work study man is no more likely to use a stop watch on certain tasks than a jeweller would use a sledge hammer to repair a wrist watch. Later on in this paper I will be

mentioning one or two of the applications which have been made within the gas industry itself which I hope will confirm the validity of the claim I have just made. In the meantime let us assume the practicability of measuring 'work content' in terms of a common unit. The term productivity then appears to have some meaning. Without standards of performance which are realistic and practical it cannot be known with certainty what ought to be achieved or by how much the actual results fall short of the possible target.

Payment Based on Work Units

When we refer to increased productivity in our industry we are assuming a standard against which this increase can be measured and our conception of a common work unit enables this to be done—that is to say, productivity can be expressed as the rate at which work units are accumulated per hour. Payment based on work units is an obvious way of introducing incentives, as controls can be established showing for any given individual or group of men the level of productivity achieved. The predominant feature of an incentive scheme based on work units is its fundamental fairness both to the operative and to management. The employer has a true indication of the work being carried out by the operative while the operative knows precisely how much work he is contributing on behalf of the employer. It is in these conditions wherein a fair day's work is accurately established that an incentive scheme can prosper and the common weakness often met in other schemes for payment by results—*i.e.*, 'good' and 'bad' jobs—no longer applies. Coincident with the introduction of an incentive scheme based on fair work standards, labour controls can be established showing essential data for management use. Such things would be the level of productivity currently being achieved. The presence of adverse operating conditions such as 'idle time,' waiting for work, for equipment, and 'excess' work which must be carried out due to lack of the proper facilities or standard conditions of working. It is by providing this information that management can take action to eliminate the causes of costs in excess of standard. This type of control is already being used in the Glasgow Division where incentive schemes based on work measurement have been introduced for the mainlaying squads and choke-clearing teams.

Results of Incentive Schemes

The results of these incentive schemes are interesting. Some five months ago there were 11 vacuum lorries engaged in clearing 'chokes,' of which some 2,500 were outstanding in the books. Today there are only three lorries so engaged while the number of chokes outstanding has fallen to something like 200 or less than one week's work. The financial benefits currently being obtained in this section amount to several thousand pounds per annum. Incentives and control have likewise been applied to the mainslaying squads, and here again the increase in productivity achieved has resulted in two pipes being laid in the same time as was required previously to lay one. Although the operatives are enjoying an extra 30s. to £2 per week, labour costs have been reduced by some 40%. One other aspect deserves mention. All work is not necessarily productive; for example, the lorries which clear chokes do not always find their tenants at home when they call. Time so spent is 'non-productive,' and prior to the introduction of control one call in every three fell into this category. On these figures being revealed steps were taken to provide cards which are given to the consumer at the time a complaint is made. The consumer completes the card suggesting a date on which access can be gained to the premises concerned. This system has worked well and today only one call in every eight is non-productive. In this way the cost of completed jobs has been still further reduced.

Perhaps the advantages of an incentive scheme based on accurate work measurement can be summed up as follows:—

(1) Productivity levels can be measured against predetermined standards and compared for different sections or even functions on a common basis.

(2) Adverse operating conditions and the excess costs involved can be revealed in such a manner that management can take action to eliminate their recurrence.

(3) Since an incentive scheme based on work units is scientifically established, a fair day's work can be established which is equitable to both the operative and the employer.

(4) Operatives can be paid in direct proportion to the work they do and therefore have the opportunity of increasing their pay packet, at the same time as reducing unit costs.

A Word of Warning

At this stage it may not be out of place to sound a word of warning. Increased productivity may start with the workman, but it is to a very large extent dependent on the service received from management. Obviously no man can lay pipes which have not been delivered to the site and no team can dig a trench until it is told in which direction it must dig. There is little doubt that the introduction of a properly designed incentive scheme and the labour controls which accompany it lay greater stress on good management than would otherwise be the case. The emphasis of supervision changes since the need to urge men on to greater effort becomes less, while the need to organise their work in advance and maintain standard operating conditions becomes even more important. I have mentioned but two of the applications which are at present being made to illustrate the diversified nature of the work which can be and is being measured; and it is interesting to note that in both these applications the level of productivity is being measured against the same anticipated standard of performance. A similar scheme can be applied equally well to gas fitters or indeed most other forms of physical effort.

So far I have referred to the ways and means of increasing productivity and how, when this is linked to incentives, reductions in labour costs can be achieved through increased productivity. However, as can be appreciated, work units can be used in many other ways. For example, outstanding work can be evaluated in work units to form the basis of a production control scheme whereby forward labour and equipment needs can be predetermined and reliable delivery promises made. Again, knowing the 'work content' of a particular task, standard costs can be predetermined, thus simplifying the task of our costing fraternity.

The Element of Material

The second element of our unit cost is material, and here again the value of a pre-determined standard and a control which shows the presence of adverse conditions is of inestimable value in reducing costs. Material utilisation has long been an important consideration in the gas industry, using as it does one of our basic raw materials which unfortunately is in all too short supply. One control feature has already been introduced—namely, the Fuel Expenditude Index. This, however, has limitations, indicating, as it does, only the intrinsic thermal yield being achieved in any given plant. As a comparative index of achievement it is of little value since it takes no account of the age and type of plant being used or the quality of the coal carbonised. The F.E.I., therefore, cannot be used as an indication of the effectiveness or efficiency with which any particular plant is being run. Here again, a start has been made in the Greenock Group to introduce 'yield standards' and controls. The process involved consists of a technical investigation in each separate plant and establishing not only a standard F.E.I. which can be expected under normal conditions, but also a standard mix of products and a standard material cost per therm of gas. Controls are then introduced based on the actual working results which show to what extent the standards have been maintained both as regards thermal yield, mix, and material costs. This information is provided each week to the district manager for his guidance and use. This form of control is now fully operative in the Greenock Group where a technical assistant has also been provided with a travelling laboratory to help district managers maintain the standards established for their respective plants.

The establishment of standards and the provision of salient and frequent information showing current operating results has helped the Greenock Group to reduce the material cost of its gas by some 11%, together with a very welcome saving in the amount of coal carbonised per 100 therms of gas made. Other divisions in Scotland are currently setting standards and introducing material controls with similar satisfactory results.

The Influence of Overheads

The final element in our cost breakdown is overheads and in this respect I feel the introduction or extension of the principles of budgetary control can be of inestimable value. The operation of budgetary control again presupposes standards inasmuch as anticipated expenditure, income, and profit, are forecast. At regular intervals control information is made available showing where actual results differ from those budgeted. Here again excesses are thrown up for action and elimination while the effect such excesses have on the forecast profit or surplus is revealed. Perhaps the most important aspect of budgetary control is the frequency with which control data is prepared. Too often the overall financial picture is provided only at the end of the year. In these circumstances the data then shown can only be of historical value as the information is too late to correct any adverse trends during the period under review. It is becoming a common practice in other industries to divide the year into 13 four-weekly periods and to produce financial controls at the end of each four-week period. In this way remedial action can be taken sufficiently early to correct any adverse trends and thus halt excess expenditure which otherwise would not be revealed until a much later date. If we agree that the basic function of management is to produce goods in the most economic manner possible, then financial or budgetary control is one of its most useful tools.

Controls in themselves are mere pieces of paper. They are only as useful as the action which they precipitate. The phrase 'Give us the tools and we will finish the job' is well known. In my view the phrase applies equally well to managers as to their workpeople. The controls I have described are to my mind tools without which no management can run its business at optimum efficiency. If these controls sound complex, this is only because they are unfamiliar. In many instances I would suggest that the provision of the control data I have mentioned will obviate the need for a mass of less important detail with which many managements are inundated.

In considering the application of these various techniques to the gas industry in Scotland it is significant and creditable that some steps have already been taken towards their introduction. There is perhaps still a long way to go and not the least of the hurdles which must be overcome is the education and training of management to understand, introduce, develop, and use the tools which can be put at their disposal to help improve the overall efficiency of the industry which, after all, must take place in every separate undertaking.

DISCUSSION

Mr. Athol W. Brown (Aberdeen) said that the introduction or consideration of the methods of control of labour, material, and overheads, or new management techniques, as advocated by the firm which Mr. Beaton represented, was an entirely new development in the Scottish gas industry. It was essential in viewing such proposals, which might appear revolutionary, especially when they were classed, not incorrectly, as members of an industry rather conservative in outlook, to maintain an open and unbiassed mind. Prejudice, uncertainty, aversion to change could invariably, in business, be associated with incompetence and failure. The gas industry in Scotland was big business, no bigger than it was immediately before nationalisation, but now, under one management, requiring and demanding a broader conception of essentials. It required an infusion of new ideas and it required the determination and courage to adopt what was new and better in favour of methods rendered obsolete by change. He was not aware of the views of the board or their future policy on the principles of management as outlined by Mr. Beaton, but one had to appraise the action of the Board in giving consideration to and trial of the techniques advocated to assess practical difficulties and determine actual results.

In referring to work measurement and the laying of mains, Mr. Beaton stated that the output of a mainlaying squad was usually expressed in yards or in pipes laid per hour or week. In his own experience that was not generally correct. The practice was to break up total cost under the main heads, materials, excavation labour, mainlaying labour, surface reinstatement, transport, etc., and take out the cost of each item per lineal yard of main. One therefore was in a position to compare unit costs, but unfortunately those were obtained at intervals or when the particular contract was finished and so were of no value in detecting inefficiency during the progress of the work. In that class of work determination and use of a work unit was of obvious value.

One immediately wondered what the attitude of the Trade Unions was to a policy involving the adoption of standard work units. Was it the practice to allow the workmen's representatives to have a say in the fixing of the work content of a unit?

Definition of Work Content

The assessment of work content had obviously to be determined with great care, as it would seem to him that once a unit of work had been fixed and applied it would be virtually impossible to alter it, especially if any alteration was suggested to increase the work content and consequently reduce incentive bonus. Was the introduction of incentives not an admission of failure by the management to obtain the best results from labour?

In the gas industry one could visualise difficulties in granting incentive payments to all categories of workers. Would this not create dissatisfaction in those workers not eligible for incentives? A further difficulty was the number of district undertakings in the Scottish area and the tremendous variance in size. In many of the smaller districts provision of incentive schemes would hardly be worth while and non-adoption of a scheme in some districts might give rise to labour unrest through lack of uniform conditions. The results obtained in Glasgow were impressive on the general lines indicated, but doubtless reference would be made to the scheme by a member with close knowledge of the conditions. He had himself some knowledge of the 'yield standards' and control as applied to gas production units, and that scheme was one he favoured strongly. It gave the management a weekly check on production results, eliminated extended periods of inefficiency, and created and maintained the interest of the manager in works efficiency. To obtain the maximum advantage from the scheme, however, it was essential to have adequate technical staff. The scheme being used at present could easily be extended to cover other major works costs. The basic figure so produced would seem to him adequate, especially in medium and small works, for the purpose of management and so would relieve the district manager of much paper work. Mr. Beaton had emphasised that the introduction of incentive schemes, of labour and material controls, involved greater stress on management, but most managers would gladly undertake work that was constructive and productive in preference to effort applied with hope of only limited result.

Method of Assessment

Mr. A. Jamieson (Renfrewshire Division) said that the Greenock Group had been on the experiment since its inception and he had watched its progress with interest. He could, of course, speak only of the assignment carried out in his own Group—*viz.*, 'Material Utilisation.'

'The first thought which will occur to most of you is that this work was a technical operation and should have been carried out by my own staff. With this I am in agreement but, unfortunately, we did not have the staff available and this fact, coupled no doubt with the indifferent results which were being obtained in some districts, was the reason for Personnel Administration being asked to prove, or otherwise, if they could assist the Board. After careful consideration at Greenock it was decided to use the Fuel Expenditure Index method of assessment as a foundation on which to build a standard of control. To enable the results obtained under the test conditions to be assessed a reference period of three months, January, February, and March, 1952, was selected. F.E.I. figures for this reference period were calculated and the results obtained under the test conditions were ultimately compared with these to give the estimated savings. That, in my opinion, is one of the weaknesses of the assignment for if one of the works had struck a temporary bad patch at that period the final results are misleading and the estimated savings considerably inflated.

(*Continued on p. 845*)

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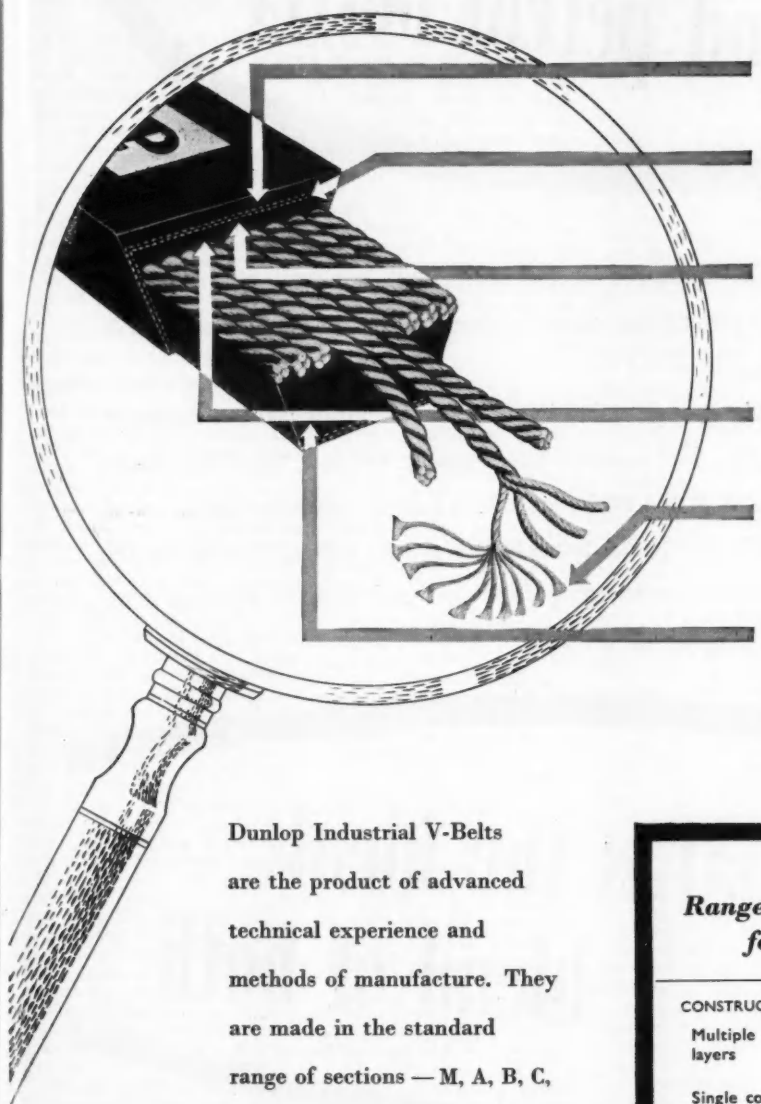

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'It is also unfortunate that in calculating the F.E.I. careful stocktaking is essential. While I do not doubt that such care was used during the test runs I feel that this might not always be the case. It will only be at the end of a financial year, when stocks are low, that the figures will be dependable, and for that reason I would like to withhold judgment on Mr. Beaton's claim for an 11% saving.

'An excellent feature of the control is that allowance is made for local conditions, such as condition of plant, whether a waste heat boiler is installed, the type of coal used. It is amazing to note the wide variations in results in works of similar size, with similar plant, and using the same coals. The best feature of the control is the small amount of extra work it places on the district managers. All that is required from them is a very simple weekly return to Group Office where the final result is calculated. This shows at once if results are being maintained, and, if not, pinpoints where the weakness lies.'

Mr. Jamieson said that although he did not yet agree with Mr. Beaton's estimate of ultimate savings he did feel that no matter what the savings were the assignment had been justified inasmuch as it had focused attention on retort house operations, sadly lacking during the past few years. It was still true today that their profits were made in the retort house.

No district manager should feel that the control would make retort house supervision easier. It would have the opposite effect as constant attention had to be given to 'heats,' throughcuts, coke consumption, steaming, etc., if the standards laid down were to be maintained and, indeed, improved. He hoped the day would come when they would be able to see standard conditions or results from carbonising plants, not only in individual districts or groups, but for the whole area of the Scottish Gas Board. Whether they would require the services of Personnel Administration, Ltd., to attain that would depend on the profits shown for the current year by the undertakings of the former Greenock Group.

Quantity and Quality

Mr. D. C. Elgin (Edinburgh, Scottish Gas Board) said it was inevitable that many of the papers presented to the Association would be of direct and immediate value only to a limited section of the audience. The message of Mr. Beaton's paper, however, was vital to all of them whether working for a gas board or for one of the firms serving the industry. As a Scottish Association they could justly claim to possess, in large measure, that cost consciousness which so many papers within the last few years had sought to kindle in technicians, but it seemed that even their most national characteristic required to be brought into line with latest practice.

Mr. Beaton had implied at the outset of his paper that although he was dealing with cost aspects he looked on these principally as techniques at the disposal of management. He stressed that 'increased productivity may start with the workman but is to a large extent dependent on the service received from management.' and these themes were reiterated and emphasised in the concluding paragraph. He was saying, in effect, that if any enterprise was to survive and prosper management must be a dynamic force, aware at all times of the latest position and trends in all sections, whether concerned with production, distribution, or sales. To help achieve that desirable state of affairs he had recommended the introduction of certain processes, each with a direct reading gauge in the form of a simple control expressed in terms of cost. That was a creditable aim and in line with recent trends in the great production industries. It showed the potentialities of accountancy properly applied, but as the tool, not the prison of management. In that connection the introductory words of the Productivity Report on Cost Accountancy repaid study. 'The technique of accountancy is of extreme importance because it works in the most nearly universal medium available for the expression of facts, so that facts of great diversity can be represented in the same picture. It is not the production of these pictures that is a function of management but the use of them.'

The introduction of an incentive scheme resulted in an increase in the quantity of work done, but what of the quality? In production engineering that could be covered by providing an inspectorate to scrutinise the pieces made, in a systematic manner. He wished Mr. Beaton would outline his recommendation for avoiding scamped work in, say, the mainlaying operation where inherent faults might take years to show. It would appear that what was required was extremely alert supervision at foreman level. Mr. Beaton should elaborate on his suggestion that the principles of budgetary control should be introduced or extended within the gas industry and he should outline how such a system might operate at a large or medium undertaking. He knew that such a technique had been introduced at a few works south of the Board but details were not yet generally available. The output of a gas undertaking over a given period was in the hands of many forces outside the control of the industry and the Weather Clerk could be a particularly subversive influence in that connection. He would like to know briefly how that could be overcome, particularly when establishing a sales budget.

The establishment of Group Technical Assistants in Scotland would prove a very welcome step, especially from the point of view of those managing the smaller undertakings. These could not previously afford to carry a full-time technical man to assist the manager in works operation and it was hoped that these new assistants would provide a sympathetic technical service where and when it was most required. Mr. Beaton had referred to the effect of a variety of products on the cost of production. It was a shock that at one undertaking the effect of the consultant's work was to reduce the thermal efficiency by a few points. But this had changed the relative quantities of the various products in such a way that the overall cost of gas production was reduced. In view of the crying need to save coal he found it difficult to decide whether a reduction in cost was ethical at the expense of decreased thermal yield.

Stemming Rising Costs

Mr. D. Beavis (Edinburgh Division) remarked that increased productivity was vital if they were to stem the spiral of rising costs, but he had still to be convinced that, in the long run, incentives in the form suggested were the whole answer. He had carefully studied what Mr. Beaton had said about methods of determining the work unit, and while he was sure that the technique was impartial, objective, and painstaking, he was still unconvinced that it could be wholly divorced from the existing standard of output. In the case of a large organisation with many undertakings there was the danger that output might rank for bonus payment in one undertaking where in another it was obtained at time rates.

Mr. Beavis said he knew that in the bricklaying trade bonus schemes were in operation with incentive payments for outputs above 500 bricks per day, whereas no employer before the war would have regarded such an output as satisfactory and there were firms today where higher figures were still obtained at plain time rates. He could think of certain tasks in his own experience which were at present carried out by two men at one undertaking and one at another, and he found it difficult to understand how an incentive scheme equally advantageous and applicable in both undertakings could be produced. The enthusiasts, of whom Mr. Beaton, of course, was one, considered that incentive schemes could be universally applied, but he felt there were still many operations in the gas industry to which such schemes were not appropriate. Were they quite sure that those operatives who were unable to take part in bonus schemes would not be made discontent by the enhanced earnings of their fellows?

For some time now in Edinburgh they had had such a scheme in operation in the meter reading section. He would be the first to admit that it had many advantages. Economically it was a real saving to the undertaking and substantially enhanced the earnings of their meter readers and collectors. But it did cause discontinent among members of the staff closely associated with these employees because they found themselves financially worse off than the men whose work they administered. He thought he was right in saying that America, which was wholeheartedly in favour of such schemes, had been reacting in recent years against them and had tended towards thinking that when new and more economical methods of working had been introduced the saving so effected should be shared all round, but on a time basis. It had to be admitted, however, that the Americans had been more successful than ourselves in securing the co-operation of labour to increase productivity.

Referring to the material utilisation investigation, the author's comments, tactfully put as they had been, indicated that they had not been getting all they should get from their plants. In that he was accurate, but it was a pity that they had not put their own retort house in order. They all knew what their plants were capable of doing and if they had not been obtaining the best performances from them they had been falling short of their responsibilities. Personnel administration could do nothing to improve performance, and the provision of technical staff referred to in the paper was surely the crux of the matter. It should not have needed Personnel Administration to point the way. He understood his own Division was soon to be visited and he assured Mr. Beaton he would be glad to see him and his staff. The paper was most stimulating and would do the Scottish industry much good.

Mr. R. Fyfe (Ayrshire Group) recalled that in a cabinet factory an employee was expected to assemble five chairs in a given time. A new employee came along and assembled seven chairs in the same time and the management broke the rate from five to seven, causing considerable trouble in the factory.

Who was to determine the number of pipes to be laid or the number of therms to be produced? High-speed methods introduced in a factory had resulted in the men using a hammer instead of a screw-driver because it was quicker. Output might be increased by incentives, but it did not mean that the quality of the work was maintained. Mr. Beaton's paper contained a new idea. Every new idea had to withstand criticism but at the end of the day it might benefit the industry.

Mr. G. E. H. Keillor (Airdrie) said the paper heralded a new outlook by the gas industry towards its wage structure. If a labourer was worth only the fixed minimum rate the employer was bound to be the loser in the long run. It was economic to pay a good man more than the minimum, rewarding good service and also reducing labour turnover. Mr. Beaton was a little too emphatic in claiming that there was only one way to reduce labour costs. There were other ways but time did not permit him to elaborate on them that afternoon. He agreed that in the wide open spaces of the district there was scope for increasing productivity by carefully devised incentive bonus schemes. The handling of coal, coke, ash, and oxide was amenable to payment by results, as were also painting and possibly mechanical maintenance in the bigger works. But for the yard men, plant operators, foremen, and staff, some method of payment by results should be found if at all possible. Perhaps the F.E.I. could be made the basis of a works incentive scheme, with a bonus for every unit over a fixed standard, plus the number of therms produced and all divided by the number of personnel concerned. That would link together technical efficiency, total output, and manpower. Production cost could be brought into the scheme by assessing a standard ratio between wage rates and cost of gas into holder and applying any difference (over or below the standard ratio) so as to modify the bonus derived from the first calculation.

Reducing Costs

The new 'tools' being fashioned to improve carbonising results would help area managers. The works manager would still have to pore over his carbonising book or go out and look over his plant as before. It was difficult to see how such a system by itself saved 11% in material costs. Was one to infer that radical alterations were made in carbonising practice?

Expressing approval of the reference to the costing year of 13 four-week periods, Mr. Keillor said that monthly returns were a nuisance when most records were on a weekly basis. Budgetary control was not new and was carried out in Dunfermline in 1925 when he was assistant to Mr. James Campbell. It took only an hour or two once a month to collect and insert in the control sheets the cost totals and relative unit costs. Through the application of scientific work measurement, materials control, and incentives they could look forward to further substantial reductions in costs.

Mr. Charles Murdoch (Scottish Gas Board) said there had always been in the history of human endeavour some kind of incentive. The incentive idea as put forward in the paper was an intelligent, progressive step for managements to adopt if productivity was to be increased. The incentive operated only after the employee had done an honest day's work for an honest day's wage. A standard of some kind had to be laid down. It was only right to say: 'If you help us to increase productivity and reduce our costs you will benefit, once you have given a fair day's work in return for a fair day's wage.' Possibly they had been wrong in starting with the mainlayers because there seemed to be an assumption that the only persons who contributed to productivity were the men in the works or those engaged on manual labour. Perhaps they should have started at the top instead of the bottom. He did not think that the country's productivity would be increased if it depended entirely on the men in the workshops. Managements were busy enough with their everyday jobs and that was why the specialist was called in. Firms like Personnel Administration, Ltd., had no great knowledge of engineering but they were specialist in knowing what was a fair job and the fair time to do it in.

The gas industry was bigger than it was before vesting day. They had 196 undertakings then, but now they had one unified control and it was a bigger job than before. They had 196 different ways of doing a job, all with different measurements and standards. The important thing was to make a contribution to the industry. They had better standards of living and these could be improved in one way only—namely, by putting more into the kitty than in the past. They had to tell their workers that if they made a reasonable contribution to the kitty they would receive a share. Otherwise their standards of life would go down. It was wrong of them not to try to improve productivity.

Mr. D. L. Dickson (Fife Group Manager) said that Mr. Beaton had given them a real example of time study in a concise and understandable manner. No excuse was necessary for such a subject being chosen, as productivity was very much a national slogan. The gas industry would take full advantage of the paper and would translate the words into deeds. One leading industrialist recently had asserted that 99% of the personnel in this country concerned with productivity talked but did nothing. The Scottish Gas Board, however, was free of that accusation. They had called in Mr. Beaton's firm to investigate and report on one or two areas and already considerable economies had resulted. To be worth while, economies had to be sustained, and that meant not only the setting up of suitable standards of attainment but also of regular comparisons. They would all agree that for better comparisons the life and condition of the plant had to be taken into account. That meant that standards had to be adjusted from time to time as circumstances altered. The approach to the subject was essentially one of commonsense, but it was obvious that in the method of application much time had to be given by specialists in order to make proper values impartially and objectively.

A Job for the Expert

The gas industry, like others, appreciated the need for increased productivity and it might be that some of its standards were outmoded. The faults, if any, in their present methods were of long growth and were not confined to the gas industry. Nor could they be attributed wholly to employees or employers. In his opinion, they were the result of many psychological changes brought about by the upheaval of two world wars, and the many advances in living standards, education and entertainment, all of which had to be paid for. Incentives themselves were not the answer and if applied haphazardly they could do more damage than good. He agreed with Mr. Beaton that incentives had to be based on sound facts impartially examined and accurately assessed and it was an expert's job.

Increased productivity was not only the employers' responsibility but also that of the workers. He thought that leading union officials recognised that fact. One of them had said recently that 'the trade union movement wanted full employment to continue but not with present methods. Changes must be made in every industry and the co-operation of management and staff is required. On the union's part this is recognised and efforts are being made to convince the rank and file of the unions concerned of this necessity.' With a continuation of good relationships with the unions and a degree of understanding on both sides many changes could be made which would be of benefit to employers, employees, and consumers alike.

Mr. D. F. Young (Glasgow Division) said that when Personnel Administration, Ltd., came to the Glasgow Division he joined in the criticism of someone from outside the industry being brought in to do what they could do for themselves. After seeing the extraordinary amount of preliminary work needed for the inception of such a scheme he was satisfied that the most economical way was to leave it to the specialists. As far as the choke-clearing squads were concerned they had to remember that there was a seasonal fall in complaints. With the advent of colder weather the number of complaints would grow and they would have more than three teams out. In regard to mainlaying, they had one or two teams not making any bonus due to the disturbance of the preliminary work mapped out before the bonus was fixed and because of the inclement weather.

Mr. Beaton replied to the various points raised, pointing out that, generally, the unions blessed the incentive scheme if the standards set seemed fair to the operatives. It was one thing to set standards and another to convince people that they were fair and accurate. He stressed that the scheme was no substitute for supervision.

City and Guilds Institute

THE report of the Council of the City and Guilds of London Institute for 1952 says that on the threshold of its 75th anniversary the Institute is in a critical and challenging position. There is no doubt that the national importance of its work in technical education is appreciated, otherwise there would not be the continued call for its syllabuses in established and new industrial fields, or for its advisory services in educational matters of a more general and far reaching nature. The appreciation, however, is not perhaps as widespread or informed as it should be among those who benefit directly. The critical point has been reached because the available resources of the Corporation and Livery Companies can no longer maintain, let alone expand, the work of the Institute. The challenge is to meet the needs of the country in training those engaged in industry—a need which increases enormously as the world becomes more industrialised. The Institute must not only concern itself with the preparation of syllabuses and the conduct of examinations, but must also take an active part in more general matters of educational interest.

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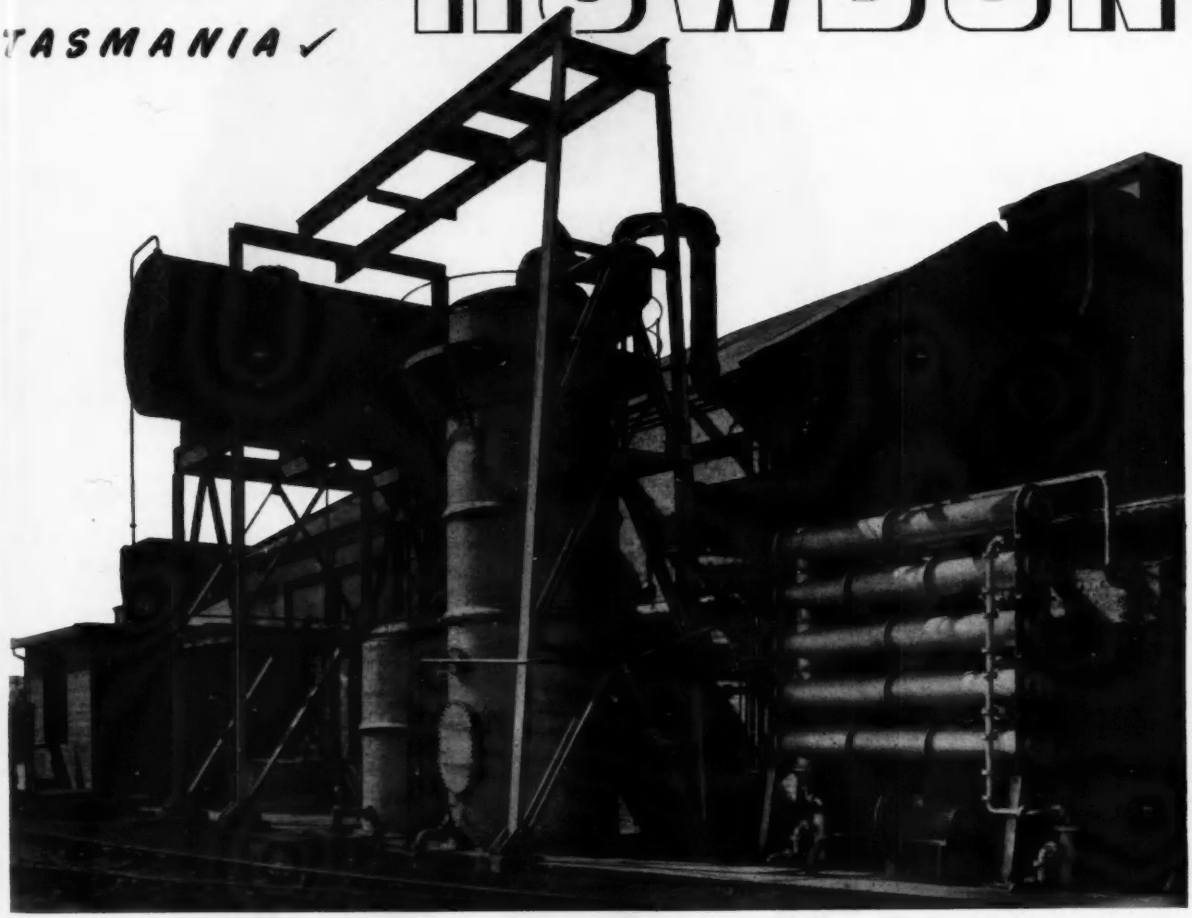

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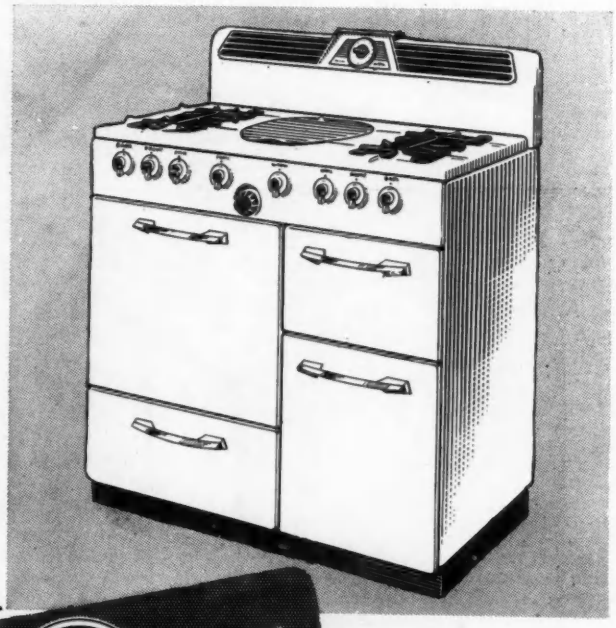

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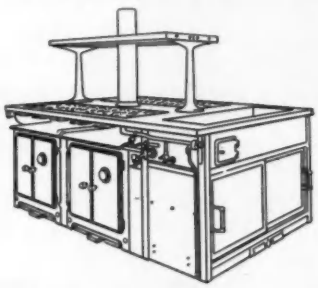

A central range incorporating a Bain-Marie and hot-closet.

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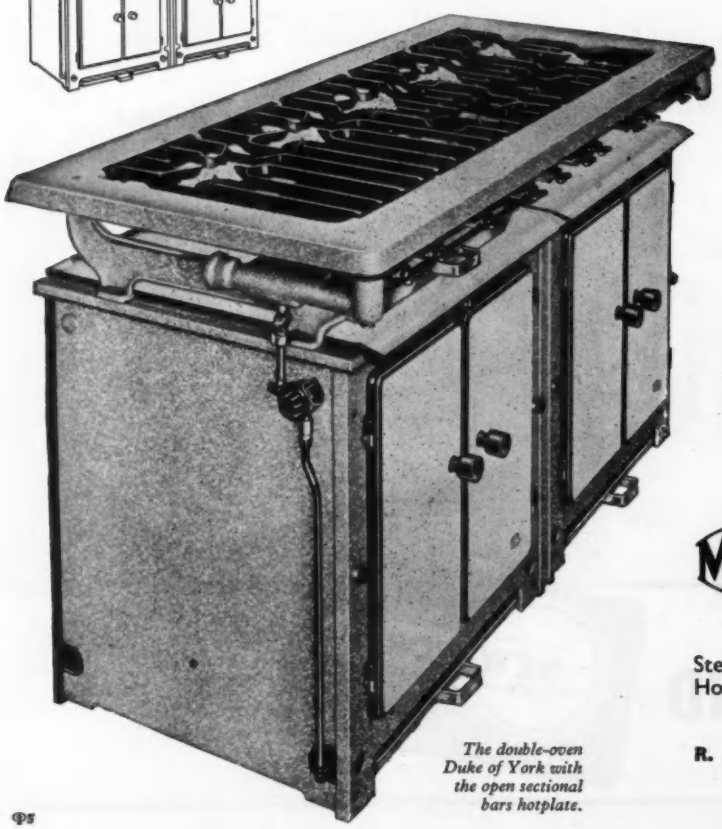

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INTERNATIONAL ROAD TAR CONFERENCE

LAST week, from September 21 to 24, the British Road Tar Association acted as host to delegates and their ladies at the International Road Tar Conference in London. This first post-war Conference was attended by delegates from many overseas countries—Belgium, France, French Morocco, Germany, Italy, Luxembourg, Netherlands, Saar, Sweden, and Switzerland. It marked the resumption of the collaboration on technical road tar problems which was successfully initiated 20 years ago, but was interrupted by the second world war.

Overseas delegates were received on Monday, September 21, by the President of the Conference, Mr. Stanley Robinson, who is Chairman of Midland Tar Distillers, Ltd., and also President of the B.R.T.A. The following two days were given up to visits and sightseeing tours. Among the organisations and plants inspected were the Road Research Laboratory (D.S.I.R.) at Harmondsworth, the tar distillation plants of the North Thames Gas Board at Beckton and of the Prince Regent Tar Co., Ltd., at Silvertown, and the new coke oven plant of the South Eastern Gas Board at East Greenwich.

The plenary session was held at the May Fair Hotel, when the President's address was followed by presentation and discussion of three papers: 'The Ageing of Road Tar,' by M. Leroux (France); 'Recent Development in Road Tar Research,' by Dr. H. G. Franck (Germany); and 'Developments in the Use of Road Tar,' by W. E. Cone (Great Britain).

In his address, Mr. Stanley Robinson referred to the fact that the first visit of the Conference to Great Britain took place at Gleneagles in 1936 under the presidency of Sir David Milne-Watson. Mr. Robinson went on to say that, while each country had its own problems, which were not necessarily alike, the fundamentals were much the same in every case, and from this common starting point they should have no difficulty in forging ahead, provided they always kept their objective clearly before them and observed certain principles.

Firstly, they must get to know each other, and there was no better way of doing this than by social intercourse at the Conference. Secondly, the Conference must collect together all the known and acknowledged facts about tar and its application, so as to get all possible benefit from past experience. Thirdly, they must exchange information and stimulate the discussion of new and promising developments. Fourthly, they must increase scientific knowledge by more and still more research; road-building was a science, and science could not progress without research.

Mr. Cone's Paper

In the course of his paper, Mr. W. E. Cone, Technical Adviser, B.R.T.A., said that lack of funds had made it necessary for road engineers to restrict their improvement works to those required to prevent foundation failure and to the re-surfacing of worn-out sections. For these and other purposes tarmacadam was a relatively inexpensive material which had given satisfactory results when applied under a variety of traffic conditions.

Types of tarmacadam surfacing ranged from the open textured to close textured materials, the difference in texture depending upon the grading of the mineral matter comprising the coarse and fine aggregate. The materials could be laid cold, warm, or hot, in one, two, or more courses according to the particular form of construction specified. Whichever type of tarmacadam was required, it must be manufactured under controlled conditions in a plant equipped with suitable measuring or weighing devices. Control of the process also required the sampling and analysis of the mixed materials. The author continued:

'As a result of a comprehensive series of experimental tar carpets laid by the Road Research Laboratory and the B.R.T.A. with various aggregates in different parts of the country, it has been shown that the life of open and medium textured surfacing is determined largely by the susceptibility of the binder to atmospheric oxidation, together with its volatility characteristics. Experience has shown that very open-textured carpets are not as a rule sufficiently durable. The incorporation of fine aggregate increases the durability of a tar carpet by closing its texture, but it is important to proportion the fine aggregate so as to obtain both a non-skid and a durable carpet. All the experiments indicate that the most critical factor in the performance of a carpeting material is the binder content, variations in which produce greater changes in road performance than do variations in any other factor. Additional evidence has been obtained from experimental work and from practical experience in various parts of the country which has enabled recommendations to be put forward for the manufacture of durable carpets. A particularly important requirement is a durable tar, and it is hoped that a suitable specification for a carpet tar will be included in the revision of British Standard No. 802: 1945: Tarmacadam and Tar Carpets, which is at present being prepared.'

Analysing Samples

'While a life of ten years has been obtained from some tar carpets, the use of a tar with a high resistance to weathering should make it possible to obtain consistently good tar carpets with a range of gradings. Tar carpets must be manufactured under controlled conditions in a plant equipped with accurate proportioning devices. It is essential that samples of the mixed materials should be taken for analysis during each day's mixing for the purpose of confirming the grading of the aggregate and the binder content.'

Mr. Cone then commented on dense tar surfacing—a hot-process tarmacadam consisting of a mixture of a coarse and fine aggregate, filler and a binder of 50°C. to 55°C. E.V.T., the proportions of which were selected so that after compaction a dense impervious material was obtained which was capable of carrying heavy traffic. Experimental work to date suggested that the design of the mix was dependent largely on the characteristics of the filler and its mechanical behaviour on the properties of the sand-filler-tar mortar. Attention was being given to the effect of the addition of special materials to improve resistance to deformation, and to the question of the best specifications to be used on the heavily trafficked roads. Dense tar surfacing had generally withstood heavy traffic satisfactorily for a period of years, and its use was extending. As yet there was no British Standard for dense tar surfacing.

The most common form of road base was hardcore or pitching, but increasing attention was being given to the use of tarmacadam as a foundation material. The value of tarmacadam for the improvement or strengthening of existing roads was already well known. In the construction of new roads, varying thicknesses of tar coated stone base had been laid on a sub-base of ashes or quarry waste; the final surface of the road consisted of single-course or two-course construction to provide a stable structure for the traffic it would have to carry. A particular feature of this type of construction was the speed with which it could be carried out by the use of laying machines. The tarmacadam was spread mechanically in successive layers to a predetermined thickness compatible with the nature of the existing sub-soil.

Mechanical Aids

'Possibly the greatest single blessing in the last two decades from which road engineers have profited economically,' continued Mr. Cone, 'is mechanisation. Development of mechanical aids has proceeded apace in keeping with the necessity for undertaking more work with a depleted labour force. A variety of mechanical equipment is available for construction and maintenance, among the more important of which are the laying machines for uniform spreading of surfacing materials and mechanical distributors for applying tar and spreading aggregate in surface dressing. The substitution of mechanical for hand methods is a principal means of reducing the cost of road work, but it is equally important that surfacing and surface dressing operations should be organised in a manner to enable the maximum amount of materials to be used per day. In addition, the skill of an operator in handling a machine is a prime factor in obtaining its efficient and economical use.

'Some indication of what can be accomplished by mechanisation in the surface dressing of roads is forthcoming from an experiment on a country road when over 6,000 gal. of binder were sprayed in one day. The work was carried out with one pressure-sprayer which had a capacity of 1,000 gal. and refilling was by a mobile tank of similar capacity taken from stocks situated a few miles away from the road. A stock of chippings was prepared in advance of the work, and they were applied to the road by eight lorries with gritter attachments. The rolling was carried out with diesel rollers.

Control Methods

'The importance of supervision and technical control of the manufacture and application of tarred materials cannot be over-emphasised. To this end, it is essential that the mixing plant should be capable of producing material in accordance with the requirements of

Continued on p. 852

the specification. Only when the manufacturer has instituted a system of technical control of quality is he in a position to feel confident that the requirements of any specification have been fulfilled. It is a sign of progress and enlightenment in methods of control and testing that a number of contractors and county engineers have set up their own laboratories in order to see that the quality of the materials supplied is in accordance with their specified requirements. The increasing awareness of the need for technical control of materials and processes is reflected in the provision of mobile laboratories by tar distillers, in whose areas of operation they can be usefully employed. Similarly, for surface dressing, methods have been developed for checking the uniformity of distribution of tar from bulk sprayers and the Association of Road Surface Dressing Contractors has played a prominent part in ensuring their application.'

In conclusion Mr. Cone said that the co-operative research between the Department of Scientific and Industrial Research and the British Road Tar Association had been responsible for many advances in technique which had led to a marked improvement in the quality of road works carried out with tar. Much had been learned both from research and road experiments regarding the properties of road tars and their significance in relation to road performance. But there were still a number of problems awaiting solution. Among these the most important was a reliable test that would unfailingly predict road performance of a binder; methods of treatment of road tar to improve durability; and the development of methods of design for road structures. The results of the research work already carried out had been made available to road engineers, and the technical services of the British Road Tar Association had been placed at their disposal to advise on the best methods of employing road tar.

Dinner and Dance

The Conference was brought to a close most happily by a dinner and dance at the Dorchester. Mr. Stanley Robinson presided at the dinner, and the toast of 'The Guests' was in the hands of Mr. W. K. Hutchison, Chairman of the South Eastern Gas Board and a Vice President of the British Road Tar Association. Mr. Hutchison referred to the very great success of the Conference not only as a means of interchanging technical information and keeping abreast of development in road tar preparation and application in many countries, but of renewing and establishing friendships and enjoying international social intercourse. There had been no fewer than 370 delegates at the Conference, 150 from overseas.

Response was made by M. H. Hondermarcq, Directeur-General des Routes, Ministere des Travaux Publics (Belgium), and M. M. Ahl, Schweizeriche Teerindustrie (Switzerland), who spoke in glowing terms of the British tradition of broadmindedness and hospitality, remarking that the meeting had proved 'more useful than a diplomatic mission.'

The toast of the International Road Tar Conference was proposed by Dr. Ing. H. Kunde, Ministerialddirektor, Bundesverkhrsministerium (Bonn), and M. M. Rumpler, Directeur, Direction des Routes, Ministere des Travaux Publics, des Transports, et du Tourism (France). In his reply Mr. Stanley Robinson paid tribute to the outstanding work, which had ensured the all-round success of the Conference, of M. M. Bing, Honorary Secretary, International Road Tar Conference (France); and of Mr. D. M. MacCormack, Secretary, and Mr. W. E. Cone, Technical Adviser, B.R.T.A. A happy note was struck at the close of the President's speech by presentations to M. Bing and Mr. MacCormack as mementoes of the occasion.

Among those who accepted invitations to the dinner were Messrs. F. M. Birks, C.B.E. (Deputy Chairman, North Thames Gas Board), G. E. Currier, O.B.E. (Deputy Chairman, North Eastern Gas Board), G. le B. Diamond, C.B.E. (Chairman, West Midlands Gas Board), E. H. Harman (Deputy Chairman, East Midlands Gas Board), R. S. Johnson, M.B.E. (Deputy Chairman, South Eastern Gas Board), H. F. H. Jones, M.B.E. (Deputy Chairman, Gas Council), T. Mervyn Jones (Chairman, Wales Gas Board), A. W. Lee (Deputy Chairman, West Midlands Gas Board), Michael Milne-Watson, C.B.E. (Chairman, North Thames Gas Board), Sydney Smith (Chairman, East Midlands Gas Board), and Sir John Stephenson, C.B.E. (Chairman, Eastern Gas Board).

World Power Conference

Annual Meeting of the International Executive

THE annual meeting of the International Executive Council of the World Power Conference was held in Western Germany during the week beginning September 7. The first Session was held at Essen on September 7, and the second Session at Duesseldorf on September 8. Sir Vincent de Ferranti, Chairman of the British National Committee and of the International Executive Council, was prevented by indisposition from presiding. In his absence the chair was taken by Mr. Gail A. Hathaway, Chairman of the United States National Committee and one of the Vice-Chairmen of the International Executive Council. The United Kingdom delegates were: Sir John Hacking, Vice-Chairman of the British National Committee (Deputy Chairman (Operations), British Electricity Authority); Dr. A. Parker, C.B.E., Hon. Secretary of the British National Committee (Director of Fuel Research, D.S.I.R.); and Mr. B. L. Metcalf (Chief Electrical and Mechanical Engineer, National Coal Board). Mr. C. H. Gray, Secretary of the Council, was also present.

The meeting was attended by 30 delegates from 17 different countries. The delegates were entertained to luncheon by the National Committee for the German Federal Republic on September 7 and 8. There was also a full programme of technical visits, and a special programme for the ladies attending with delegates.

Invitations for the fifth World Power Conference, to be held in 1956, were issued by the National Committees of Austria, the German Federal Republic, and Yugoslavia. Unless two of these three invitations are withdrawn, it will be necessary in accordance with constitutional procedure for a special meeting of the International Executive Council to be held to decide by majority vote which invitation is to be accepted. It is intended that such a special meeting of the Council shall, if required, be held in London in November.

A Sectional Meeting of the World Power Conference is to be held in Rio de Janeiro from July 25 to August 8, 1954. Announcements were made by the delegate representing the Brazilian National Committee of the arrangements for this meeting.

The Canadian delegate confirmed an invitation for a Sectional Meeting to be held in Canada in 1958. The Chairman of the Swiss National Committee issued an invitation for a Sectional Meeting to be held in Switzerland in 1960.

Relationships with the United Nations and with UNESCO were discussed. There was a report on co-operation with the United Nations (especially with the Regional Economic Commissions and with the Statistical Office) over a number of matters of common interest. It was announced that the World Power Conference has recently been admitted to consultative relationship with UNESCO.

An invitation from the Brazilian National Committee was accepted for the 1954 meeting of the International Executive Council to be held in Rio de Janerio at the time of the Sectional Meeting of the World Power Conference.

The annual executive meeting of the International Commission on Large Dams was held in Paris on September 11. Mr. Gail A Hathaway (United States), Chairman of the Commission, was in the chair. The British delegate was Sir William Halcrow, who is one of the Vice-Chairmen of the Commission. Dr. Dr. F. M. Lea, C.B.E. (Director of Building Research, D.S.I.R.), was also present as a British representative; and Mr. C. H. Gray attended as observer.

The fifth congress of the International Commission for Large Dams will be held at Paris in 1955. The programme for this congress was discussed. The congress proper will be followed by study tours in France itself and in North Africa. It is expected that the sixth congress of the Commission will be held in the United States in 1958, in association with the Sectional Meeting to be held in Canada in the same year.

Copies of the annual report for 1952 can be obtained from the offices of the British National Committee, World Power Conference, 201-2, Grand Buildings, Trafalgar Square, London, W.C.2, price 1s. 6d., post free. A new edition of a leaflet has been issued, giving in succint form information about the past history and current activities of the World Power Conference together with a list of publications. Copies (for which there is no charge) can be obtained from the offices of the British National Committee.

The Annual Meeting of the London and Southern Section of the Institution of Gas Engineers, originally fixed for October 20, has had to be postponed until October 27. Mr. L. W. Smith will present his paper on 'An Accountant in the Gas Industry' at the meeting, which is timed to start at 2.40 p.m. at the Institution of Gas Engineers, 17, Grosvenor Crescent, S.W.1.

PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words)—minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep × 7" wide; block screen 120.

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APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

DRAUGHTSMAN (SENIOR) age 30/40, for large constructional engineering Co. in the Midlands. Wide gas holder and platework experience essential. Good opening for right man. Pension scheme. Write in confidence stating age, experience, and qualifications and salary expected to: Director & Secretary, Box No. 256, 19/21 Corporation Street, Birmingham, 2.

EAST MIDLANDS GAS BOARD

ASSISTANT TECHNICAL OFFICER

APPLICATIONS are invited for the appointment of ASSISTANT TECHNICAL OFFICER at the Headquarters of the Board. The commencing salary will be £1,250 per annum.

The Technical Officer is responsible for advising the Board on production and distribution matters and the person appointed will be required to assist primarily in the preparation of reports, the scrutiny of applications from Divisions for authorisation of capital expenditure and the study of operating results and costs.

Associate Membership of the Institution of Gas Engineers will be a minimum qualification and the possession of an appropriate degree will be taken into account in assessing the suitability of candidates. Practical experience of both production and distribution is an essential qualification.

The successful candidate may be required to pass a medical examination and, unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications stating age, education, qualifications and experience, together with the names of two referees, should be addressed to the undersigned to be received not later than Saturday, October 17, 1953.

A. GWYNNE DAVIES,
Secretary.

Beverley House,
University Road,
Leicester.
September 23, 1953.

A COMPANY OF The Parkinson & Cowan Group is desirous of increasing its sales organisation and, to this end, invites applications from representatives, age 30/45, covering various parts of the country with experience in the field of domestic gas burning appliances. The positions will be permanent and pensionable. Applications, in strictest confidence, to Personnel Manager, Iron Lane, Stechford, Birmingham, 9.

NATIONAL COAL BOARD

EAST MIDLANDS DIVISION

APPLICATIONS are invited for the post of CHEMICAL PLANT MANAGER at a large composite coke oven and chemical plant now being erected. Applicants should have a thorough knowledge of the principles of chemical engineering and industrial chemistry. In particular, experience in Benzole rectification, tar distillation, sulphuric acid and sulphate of ammonia manufacture and gas purification is required. Salary will be in accordance with qualifications and experience.

Applications marked 'S.V. 273', with full details of age, education, qualifications and experience, to be sent to the Secretary, N.C.B., East Midlands Division, Sherwood Lodge, Arnold, nr. Nottingham, not later than fourteen days after publication.

NORTHERN GAS BOARD

WESTERN GROUP

TECHNICAL ASSISTANT—
CARLISLE DIVISION

APPLICATIONS are invited for the above appointment.

Applicants should be experienced in the operation and maintenance of continuous vertical retorts with modern ancillary plant.

The salary will be in accordance with Grade A.P.T. VI of the National Salary Scales (£490-£570 per annum).

The successful applicant will be required to pass a medical examination and be subject to the provisions of the Board's Staff Pension Scheme.

Applications stating age, training, qualifications and experience should be addressed to the Divisional General Manager, Gas Works, Rome Street, Carlisle, not later than October 10, 1953.

A. R. CROFT,
Group General Manager.

WEST MIDLANDS GAS BOARD

ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the appointment of ENGINEERING DRAUGHTSMAN at Board Headquarters located in Birmingham.

Preference will be given to candidates with Higher National Certificate (Mechanical), or equivalent, and with experience in the layout, and design of Gas Works plant.

The salary for the post will be within Grade IX (£615-£715 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

(*Classified advertisements continued on page* 854)

APPOINTMENTS VACANT (ctd.)

LISBURN URBAN DISTRICT COUNCIL

GAS DEPARTMENT

APPLICATIONS are invited for the position of General Foreman.

Applicants should have previous experience in the operation and control of horizontal retorts and C.W.G. plant and be able to supervise the repairs and maintenance of all gas works plant and machinery. A new Council house will be available at a rent to be fixed.

Full details of training and experience to be sent to the undersigned.

G. A. McNEICE,
Engineer and Manager.

Gas Works,
Lisburn,
Northern Ireland.
September 14, 1953.

CITY COUNCIL OF SINGAPORE

GAS DEPARTMENT

APPLICATIONS are invited for the posts of ASSISTANT GAS ENGINEER, DISTRIBUTION ENGINEER and ASSISTANT DISTRIBUTION ENGINEER each on a 3 years' agreement in the first instance.

2. Applicants for the post of (i) ASSISTANT GAS ENGINEER should be of good education and address and must possess the Higher Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Manufacture) *or* alternatively the Ordinary Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Manufacture) *plus* the Ordinary Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Supply) (or equivalent) and should preferably be Associate Members of the Institution of Gas Engineers. It is essential that the appointee should be about 35 years of age with a sound experience of general administration and must have had extensive practical experience in Gas Manufacture, with preferably experience in Distribution. The appointee must be fully capable of supervising normal Gas Works routine, staff and labour concerned and should also be experienced in preparing plans for alterations to Works layout, installation and new plant, etc.

(ii) DISTRIBUTION ENGINEER should be about 35 years of age, of good education and address and must possess the Higher Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Supply) *or* alternatively the Ordinary Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Supply) *plus* the City & Guilds Final Certificate in Gas Fitting (or equivalent) and should preferably be Associate Members of the Institution of Gas Engineers. It is essential that the appointee shall be fully experienced in the supervision of the Distribution side of a Gas undertaking and that he shall have the necessary drive, personality, sales organisation and administrative ability to ensure the proper control and direction of all the activities of the Distribution Section.

(iii) ASSISTANT DISTRIBUTION ENGINEER should be between 23 and 27 years of age and should preferably be unmarried. They must hold at least the Ordinary Grade Certificate of the Institution of Gas Engineers in Engineering (Supply) and it is desirable that they also hold the City & Guilds Certificate in Gas Fitting (Final Grade). They must have a good practical knowledge of gas fitting, mains and service laying and it is also desirable that they have a background knowledge of the modern application of gas in industry and experience of repairs to dry meters. Applicants must have had at least two years administrative and supervisory experience in the Distribution Department of a Gas Undertaking.

(*Continued in next column*)

3. The commencing monthly salary offered for the posts of ASSISTANT GAS ENGINEER and DISTRIBUTION ENGINEER is between $910 (£1,274 per annum) and $1,030 (£1,442 per annum) and for the post of ASSISTANT DISTRIBUTION ENGINEER between $550 (£770 per annum) and $670 (£938 per annum) depending upon the appointee's qualifications and experience.

4. If placed on the permanent establishment after satisfactory completion of the Agreement the basic salary for the posts of ASSISTANT GAS ENGINEER and DISTRIBUTION ENGINEER will be in the scale $630 rising to $1,200 per month (£882 to £1,680 per annum) and for the post of Assistant Distribution Engineer in the scale $550 rising to $1,070 per month (£770 to £1,498 per annum).

5. Expatriation allowance and cost of living allowance at such rates as may be approved by the Council from time to time are payable. The existing rates are as follows :—

Expatriation Allowance—
- £287 per annum on basic salaries up to $740 a month ;
- £343 per annum on basic salaries from $871 to $1,000 a month.

Cost of living Allowance—
- £238 per annum on basic salaries of $550 to $910 a month and £224 per annum on basic salaries of $950 to $1,030 a month for a single man ;
- £315 per annum rising to £348 per annum on basic salaries of $550 to $670 a month and £385 per annum on basic salaries of $910 to $1,030 a month for a married man with no children ;
- £412 per annum rising to £471 per annum on basic salaries of $550 to $670 a month and £560 per annum on basic salaries of $910 to $1,030 a month for a married man with one or more children.

6. For a single man the minimum total emoluments on a basic monthly salary of $550 and $910 would amount to £1,295 and £1,715 per annum respectively ; for a married man with no children £1,372 and £2,002 per annum respectively ; and for a married man with one or more children £1,469 and £2,177 per annum respectively.

7. $1 equals 2s. 4d.

8. Partly furnished quarters provided if available at 6% of basic salary or housing allowance paid in lieu.

9. *Passages*—For the posts of Assistant Gas Engineer and Distribution Engineer First Class Passages will be provided for appointees, their wives and own children under the age of 12 years at the date of sailing and for the post of Assistant Distribution Engineer Tourist Class passages subject to a maximum of three full passages for each officer.

10. *Leave*—1 month per year of service plus period of voyage, on satisfactory termination of agreement or 4 days a month of resident service plus voyage leave after 48 months if appointed to the Permanent Staff and thereafter at shorter periods. 14 days local leave per year.

11. *Provident Fund*—Compulsory Provident Fund contributions at present 7½% of salary to which the Council donate 7½% rising to 10% after 10 years' service, 15% after 15 years' service and 20% after 20 years' service. This scheme is under review.

12. Applications in DUPLICATE giving full personal and technical information, with *copies* of 3 recent Testimonials also in duplicate to Messrs. Allen & Williams, Agents to the City Council, 1, Victoria Street, London, S.W.1, before Tuesday, October 20th, 1953.

TECHNICAL SALES CORRESPONDENT/ REPRESENTATIVE aged 25/30 required by The Morgan Crucible Co. Ltd. Knowledge of furnace construction and operation together with background of refractories technique essential. As the position may involve continental travel some knowledge of one or more European language is desirable. Successful applicant would be based at Battersea. Write giving details of age, experience and qualifications to the Staff Manager, Battersea Church Road, S.W.11.

APPOINTMENT WANTED

DISTRIBUTION FOREMAN, 18 years practical and technical experience in responsible position requires permanent post.—70, High St., Gt. Missenden, Bucks. *Phone* 100.

MISCELLANEOUS

A SOUND INVESTMENT

THESE DAYS, a sound investment is somethin to write home about. What we write of here is not a new discovery, for it has long been at the disposal of industry. The point is that only the alert are using it to their full advantage. We refer to the help afforded to administration by a FULL PHOTOGRAPHIC RECORD of constructional jobs from foundation to completed building, from rough casting to finished product. Nothing escapes the eye of the camera. No other recorder covers such a wide field. A progressive file of photographs taken at regular, specified intervals, is an ever-present aid to the busy executive. It can be referred to at once in case of any point which may arise during the construction of plant or the making of a product. It shows progress at a glance unmistakably and eliminates the cause of wrangling and argument.

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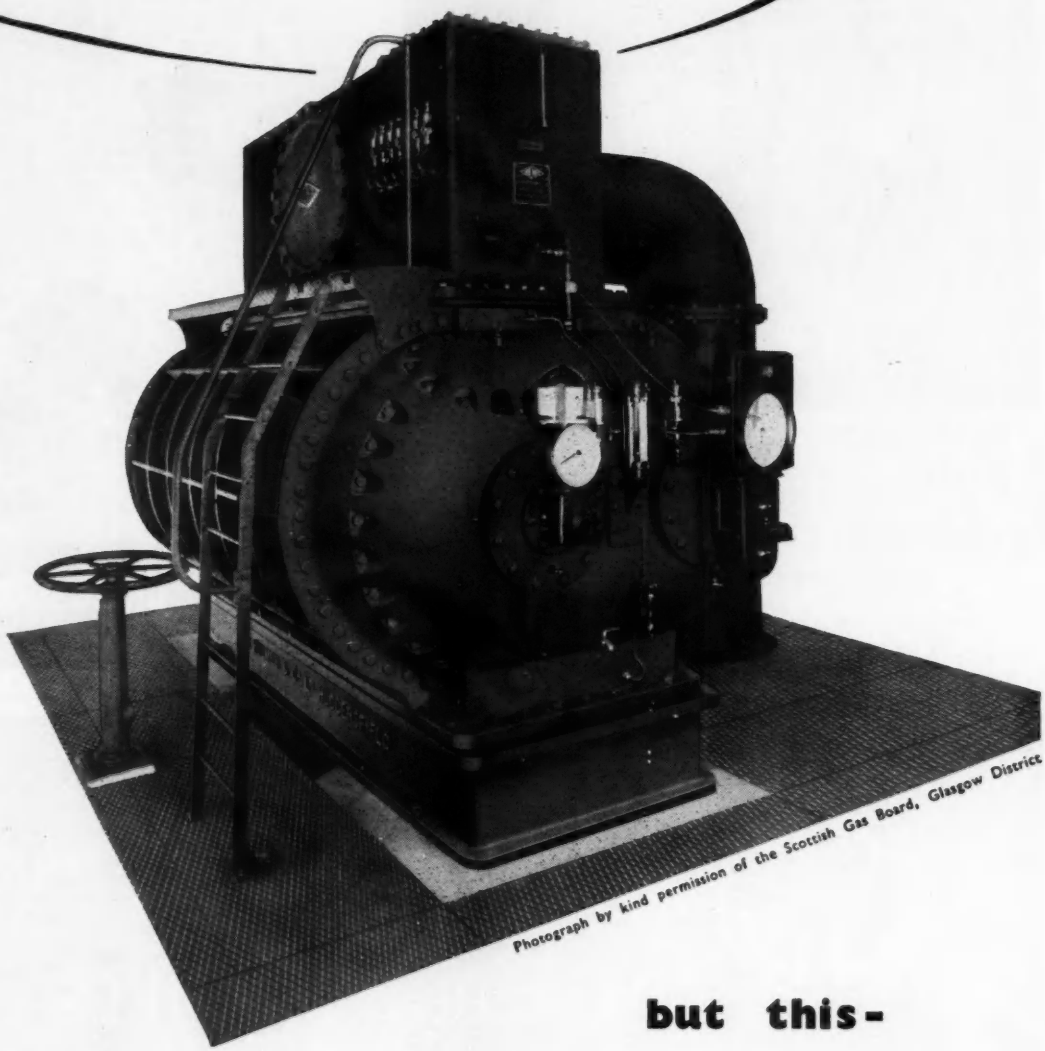

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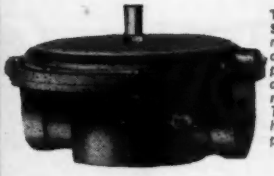

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FOR CONTROLLING THE QUALITY OF AIR/GAS MIXTURE *irrespective of varying pressures and resistances. Temperature control is varied by manipulation of the air cock only.*
CAPACITY RANGE: *from 130 to 1,380 cub. ft. of gas per hour according to air pressure (¼ lb. to 1 lb.) and size. For low pressure gas systems.*
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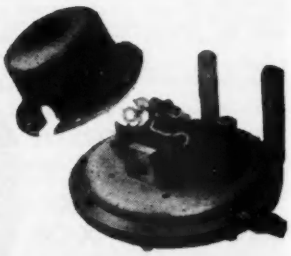
RANGE: *Type 1 operates between .2" and 1.2" w.g. pressure.*
Type 2 operates between 1.2" and 5" w.g. pressure.
Type 3 operates between 5" and 15" w.g. pressure.
Additional applications include its use as (a) an air flow switch in conjunction with a flame failure device and (b) a gas meter protector.



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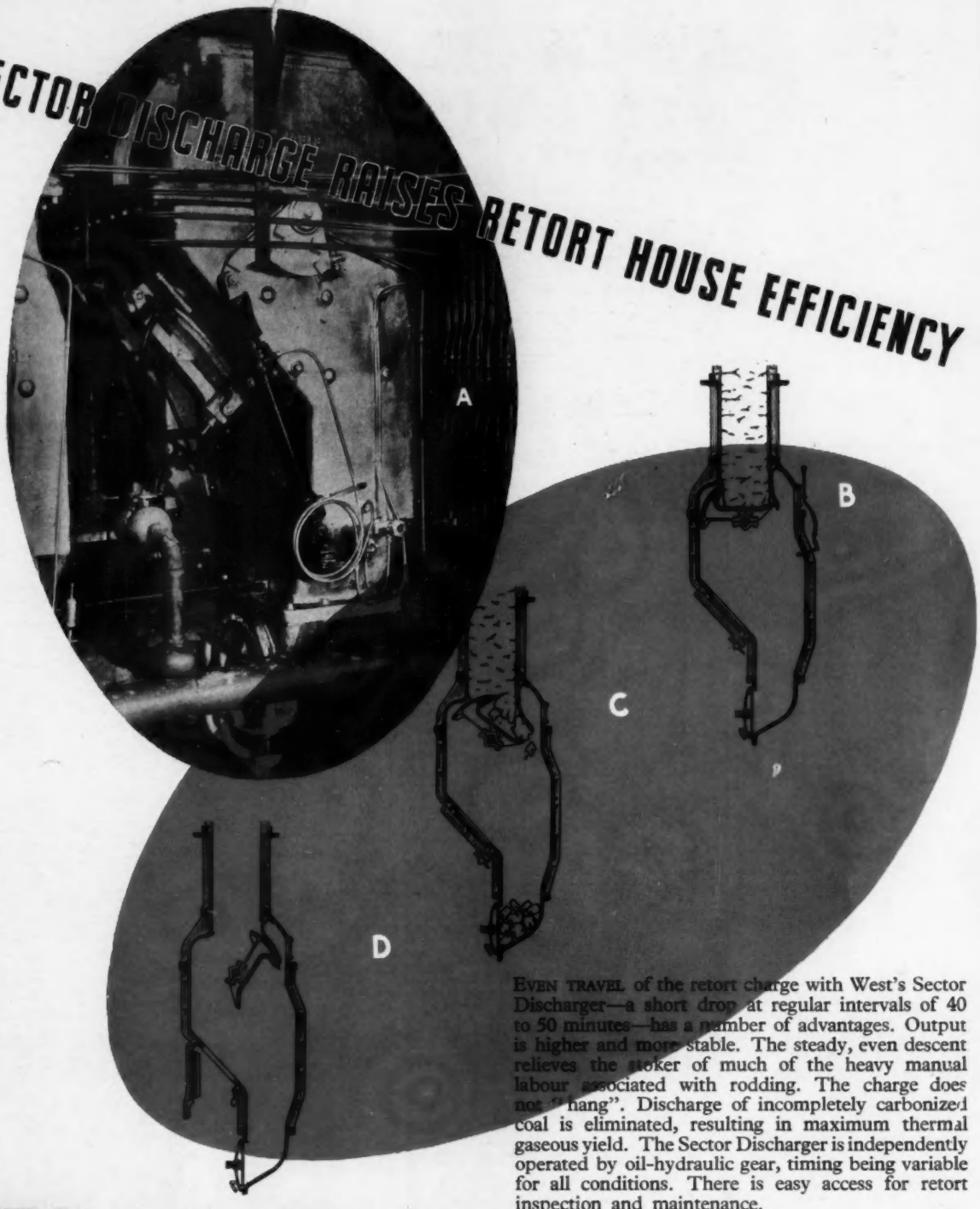
SECTOR DISCHARGE RAISES RETORT HOUSE EFFICIENCY



EVEN TRAVEL of the retort charge with West's Sector Discharger—a short drop at regular intervals of 40 to 50 minutes—has a number of advantages. Output is higher and more stable. The steady, even descent relieves the stoker of much of the heavy manual labour associated with rodding. The charge does not "hang". Discharge of incompletely carbonized coal is eliminated, resulting in maximum thermal gaseous yield. The Sector Discharger is independently operated by oil-hydraulic gear, timing being variable for all conditions. There is easy access for retort inspection and maintenance.

Illustrations: A. Exterior view showing oil-hydraulic drive. B. Discharger at rest. C. Operating. D. Access position for inspection of empty retort.

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